

Health Departments: Interim Guidance on Developing a COVID-19 Case Investigation & Contact Tracing Plan

Table of Contents

- I. [Introduction](#)
- II. [Scaling Up Staffing Roles Involved in Case Investigation & Contact Tracing](#)
- III. [When to Initiate Case Investigation & Contact Tracing Activities](#)
- IV. [Investigating a COVID-19 Case](#)
- V. [Contact Tracing for COVID-19](#)
- VI. [Outbreaks](#)
- VII. [Special Considerations](#)
- VIII. [Building Community Support](#)
- IX. [Data Management](#)
- X. [Evaluating Success](#)
- XI. [Confidentiality and Consent](#)
- XII. [Support Services to Consider](#)
- XIII. [Digital Contact Tracing Tools](#)
- XIV. [Resources](#)

[Appendix A – Glossary of Key Terms](#)

[Appendix B - Tips for Locating COVID-19 Cases and Contacts](#)

[Appendix C - Data Elements for Case Investigation & Contact Tracing Forms](#)

[Appendix D – Tool for Estimating the Number of Contact Tracers Needed](#)

This interim guidance document is intended to assist state, local, territorial and tribal health departments develop jurisdictional plans for the implementation and enhancement of COVID-19 case investigation and contact tracing efforts.

Content will be updated as new information is available.

I. Introduction

Case investigation* and contact tracing are fundamental activities that involve working with a patient who has been diagnosed with an infectious disease to identify and provide support to people (contacts) who may have been infected through exposure to the patient. This process prevents further transmission of disease by separating people who have (or may have) an infectious disease from people who do not. It is a core disease control measure that has been employed by public health agency personnel for decades. Case investigation and contact tracing are most effective when part of a multifaceted response to an outbreak.

Key Considerations for COVID-19

- Since COVID-19 can be spread before symptoms occur or when no symptoms are present, case investigation and contact tracing activities must be swift and thorough.
- The complete clinical picture of COVID-19 is not fully known. As scientists learn more, updates may be made to recommendations for testing priorities and the contact initiation window (when the patient was infectious and not under isolation) in which contacts should be elicited.
- Remote communications for the purposes of case investigation and contact tracing should be prioritized; in-person communication may be considered only after remote options have been exhausted.
- Given the potentially large number of cases and contacts, jurisdictions may need to prioritize case investigation and contact tracing activities. Prioritization should be based on vulnerability, congregate settings/workplaces and healthcare facilities.
- Depending on jurisdictional testing capacity, case investigations may be considered for patients with a probable diagnosis of COVID-19, not just confirmed COVID-19 cases.
- Broad community engagement is needed to foster an understanding and acceptance of local case investigation and contact tracing efforts within each community.
- Significant social support may be necessary to allow patients with probable and confirmed COVID-19 diagnoses to safely self-isolate and close contacts to safely self-quarantine.
- Due to the magnitude of the pandemic, jurisdictions will likely need to build up their workforce, recruit from new applicant pools, and train individuals from varied backgrounds.
- The use of digital contact tracing tools may help with certain case investigation and contact tracing activities but will not replace the need for a large public health workforce.

Case investigation is the identification and investigation of patients with confirmed and probable diagnoses of COVID-19, and contact tracing is the subsequent identification, monitoring, and support of their contacts who have been exposed to, and possibly infected with, the virus. Prompt identification, voluntary quarantine (hereby referred to as *self-quarantine* in this document unless otherwise noted), and monitoring of these COVID-19 contacts can effectively break the chain of disease transmission and prevent further spread of the virus in a community. While case investigation and contact tracing for COVID-19 may be new, health departments and frontline public health professionals who perform these activities have experience conducting these activities for

tuberculosis, sexually transmitted infections, HIV, and other infectious diseases. *Case investigation and contact tracing are well-honed skills that adapt easily to new public health demands and are effective tools to slow the spread of COVID-19 in a community.*

This guidance aims to provide a foundation for state, territorial, local, and tribal development of case investigation and contact tracing plans. It is important to note that COVID-19 case investigation and contact tracing activities will vary based on the level of community transmission, characteristics of the community and their populations, and the local capacity to implement case investigation, contact tracing, and COVID-19 testing.

**Investigation* in this context refers to a public health/infectious disease investigation and should in no way be interpreted as a criminal investigation.

II. Scaling up Staffing Roles Involved in Case Investigation & Contact Tracing

Successful case investigation and contact tracing for COVID-19 is dependent on a robust and well-trained public health workforce. Many are familiar with case investigation and contact tracing as a core strategy used in outbreak investigations ([CDC Field Epidemiology Manual](#)). It has also been implemented for decades by Communicable Disease Investigators (CDI) or Disease Intervention Specialists (DIS) in health departments throughout the United States to prevent and control tuberculosis, sexually transmitted infections, HIV, and other infectious diseases, as well as to respond to outbreaks.

To be effective, case investigation and contact tracing requires staff with adequate training, language skills, cultural sensitivity, supervision, and access to social and medical support for patients and their contacts.

One way to quickly scale up surge capacity for case investigation and contact tracing is to specify two explicit job tasks for designated staff:

Job Task 1. *Case Investigation* – Interviewing patients with COVID-19, eliciting their close contacts, monitoring the patients for COVID-19 symptoms, connecting patients to resources to support self-isolation

Job Task 2. *Contact Tracing* – Notifying close contacts of their potential exposure, referring them to testing, monitoring them for COVID-19 symptoms, connecting contacts to resources to support self-quarantine

Case investigation and contact tracing can be handled by one properly trained person when the number of patients diagnosed with COVID-19 and their close contacts can be interviewed by the staff member within 24 hours of being reported to the health department. When the number of reported daily cases does not allow for case interviews within 24 hours, a divided approach employing several staff can provide a focused scope of activity and streamlines the training competencies for the surge workforce. One staff member (case investigator) interviews and elicits contacts from a patient with COVID-19, and additional staff members (contact tracers) notify and follow-up with the patient's contacts. This approach requires excellent communication between staff to ensure clarity and prompt transfer of information, limited redundancy, and cohesive messaging to patients with COVID-19 and their contacts. *Given each patient with COVID-19 will likely have multiple close contacts, staffing plans should include a greater number of contact tracers to meet this demand.*

Public health personnel with infection control, worker safety, and health expertise will be required to support case investigation and contact tracing within healthcare facilities (e.g., hospitals, acute care centers), critical infrastructure settings (e.g., meat and poultry processing facilities, grocery stores), and other congregate living or workplace settings (e.g., long-term care facilities, correctional facilities). These complex investigations require the application of infection control principles to make appropriate recommendations and protect additional residents and workers from infection. Occupational health specialists should also be engaged to assess COVID-19-related protocols in place to promote workers' health and safety.

Scaling up case investigation and contact tracing efforts ideally involves a large multidisciplinary workforce under the daily oversight and management of a leadership team with subject matter expertise. The table below outlines the various roles of key public health staff needed. There may be variability in the title and classification of staff conducting these activities; however, the roles appear to be fairly consistent across jurisdictions. Depending on the jurisdiction, each role may be assigned to an individual staff member or one staff member may cover several roles.

Roles and Responsibilities of Key Public Health Staff to Support COVID-19 Case Investigation & Contact Tracing

Role	Description	Existing Public Health Classifications Performing these Activities	Surge Capacity Workforce* with Required Training
Surveillance Triage and Support	Processes incoming laboratory and provider reports in surveillance system. Follows-up to obtain relevant medical and demographic information. Acts as a resource for interjurisdictional communication & transfer of patient and contact information. Responsible for gathering relevant locating information (e.g., “people-searches”) for patients and contacts.	Surveillance Data Clerks, Disease Intervention Specialists (DIS)***	Administrative Support Staff, Data Entry Technicians
Case Investigator	<p>Conducts interviews of patients with confirmed or probable COVID-19, with a focus on motivational interviewing and cultural competency. Interviews should be guided by standard protocols and include: providing disease-specific information; assessing signs and symptoms, and underlying health conditions; discussing symptom onset to determine window period for contact elicitation and exposure risk for close contacts; discussing work, social, recreational, and community activities to identify who may have been exposed; eliciting information on close contacts, including names, exposure dates and locating information; and assessing support needs to maintain health and compliance during self-isolation.</p> <p>Facilitates testing and referral to healthcare services and resource care coordination, as indicated. May conduct home-based specimen collection.</p> <p>Provides recommendations for self-isolation and review of daily monitoring procedures. Conducts daily monitoring during self-isolation—temperature, signs/symptoms, use of fever-reducing medications—via electronic tool (e.g., smartphone app, case management software) or other designated mechanism until patient is no longer infectious.**</p>	Disease Intervention Specialists (DIS)***, Public Health Associate Program (PHAP) Assignees, Public Health Nurses, Epidemiologists	Public Health Graduates or Current Students (MPH and Bachelors), Retired Registered Nurses, Health Educators, Social Workers, Medical or Nursing Students, Patient Navigators, Community Health Outreach Workers/Promotores, Community Members with emotional intelligence, good communication and problem-solving skills. Ideally, they have language skills or similar cultural/social background as patients.
Contact Tracer	<p>Communicates with contacts to notify them of exposure, provides disease and transmission information, gathers data on demographics, living arrangements, and daily activities. Asks about signs/symptoms and underlying medical conditions. Provides referrals for testing (if appropriate). May conduct home-based specimen collection.</p> <p>Provides recommendations for self-quarantine and reviews daily monitoring procedures. Assesses supports necessary to maintain compliance during self-quarantine. Conversations with contacts should be guided by standard protocols. Conducts daily monitoring during self-quarantine—temperature, signs/symptoms, use of fever-reducing medications—via electronic tool (e.g., smartphone, case management software) or other designated mechanism, until 14 days after last potential exposure, and referral to healthcare if contact becomes symptomatic.**</p>	Disease Intervention Specialists (DIS)***, Public Health Investigators, Public Health Associate Program (PHAP) Assignees, Public Health Nurses, Epidemiologists	Community Health Outreach Workers/Promotores, Medical Assistants, Teachers, Librarians, College Students, Customer Service-Oriented Professionals such as Flight Attendants, Call Center Employees, Restaurant and Other Service Industry Employees
Case Investigation & Contact Tracing Lead	Directly oversees the work of the Case Investigator and/or Contact Tracer and others who may work as part of a team. Assigns work and oversees the quality of work. Ensures completion of case interviews and contact follow-up according to established standards. Reviews work for missing information, inconsistencies, or areas that need further	Supervisory Public Health Nurses, Senior Epidemiologist	Supervisory Public Health Nurses, STD Program Front Line Supervisors, Public Health Investigator Supervisors,

	<p>exploration and directs staff follow-up to seek clarification and obtain additional information. Addresses complex issues with cases or contacts that have been escalated by staff.</p> <p>Uses qualitative (interview audits) and quantitative (review of statistical outputs) methods to review performance and determine areas for formal or informal professional development, training, coaching, and mentoring. When necessary, uses progressive discipline to address performance or conduct issues. Recognizes staff for exceptional and outstanding performance. Maintains employee personnel files.</p>		<p>Communicable Disease Investigator Supervisors, TB Case Investigators/Outreach Worker Supervisors</p>
Care Resource Manager	<p>Assesses social support that patients and contacts need to maintain healthy living in self-isolation or self-quarantine. Identifies housing needs and facilitates transition to appropriate housing supports. Provides tools (e.g., thermometer) to assist with daily monitoring and prevent further spread in home. Coordinates other support services such as delivery of food or medications, and referral to programs that provide financial assistance.</p>	<p>Patient Navigators, Linkage to Care Specialists, Disease Intervention Specialists</p>	<p>Social Workers, Medical Assistants, Community Health Outreach Workers/Promotores, Medical Case Managers, Medical Care Coordinators</p>
Self-Isolation & Self-Quarantine Monitor	<p>Daily monitoring (ideally) of patients with COVID-19 during self-isolation and contacts during self-quarantine—temperature, signs/symptoms—via electronic tool (e.g., smartphone app, case management software) or other designated mechanism. Assesses changes (initiation or increase in severity) in COVID-19 signs and symptoms. Facilitates prompt medical attention, as necessary. Tracks when patients or contacts are eligible to discontinue self-isolation/self-quarantine and refers them to testing when available to assess their readiness for discontinuation.**</p>	<p>Community Health Outreach Workers</p>	<p>Certified Medical Assistants, Health Educators, Patient Navigators, Community Members with emotional intelligence, good communication and problem-solving skills, language skills</p>
High-Risk Medical Monitor	<p>Interactive daily monitoring of patients with COVID-19 during self-isolation and contacts during self-quarantine who are at higher risk for severe disease. Assesses changes (initiation or increase in severity) in signs and symptoms. Facilitates prompt medical attention, as necessary. Tracks when patients or contacts are eligible to discontinue self-isolation or self-quarantine.</p>	<p>Public Health Nurses</p>	<p>Nurse Practitioners, Physician Assistants, Registered Nurses, Licensed Vocational Nurses</p>
Infection Control Personnel	<p>Conducts investigation of congregate living facilities (e.g., skilled nursing facilities, hospitals, acute care settings, long-term care facilities, group homes, homeless shelters, prisons, jails) and workplaces that have a patient (either resident/patient or staff member) with COVID-19 to assess potential exposure of other staff and residents/patients at the site and recommend infection control procedures.</p>	<p>Infection Control Practitioners (Nurses or Physicians), Hospital Acquired Infection Practitioners (Nurses or Physicians), Hospital Epidemiologists, Occupational Health Liaisons, Field Epidemiologists</p>	<p>Public Health Nurses, Registered Nurses, Physicians</p>
Data Manager	<p>Manages digital infrastructure for surveillance and contact investigation. Abstracts data from surveillance system for import into appropriate contact investigation platform and visa-versa, when automated data synchronization is not available. Assesses and improves data quality and interoperability of data systems. Supports the development and modification of data systems to appropriately capture, integrate and report multiple data streams necessary to monitor response progress and outcomes.</p>	<p>Epidemiologists, Data Managers, Public Health Informatics Specialists</p>	<p>Software Developers, Systems Engineers, Data Engineers, Data Integration Specialists</p>
Epidemiologist	<p>Analyzes data on cases and contact outcomes in order to identify outbreaks and priority populations. Monitors and evaluates the response in order to shift program efforts appropriately.</p>	<p>Epidemiologists, Epidemic Intelligence Service Officers (EISOs), Career Epidemiology Field Officers (CEFOs), Statisticians, Research Scientists, Data Scientists</p>	<p>Epidemiologists, Statisticians, Research Scientists, Data Scientists, Epidemic Intelligence Service Officers (EISOs), Epidemiology and Statistics Graduate</p>

			Students, and other fellows
Clinical Consultant	Provides clinical support to the case investigation team, provides consultation for complex cases, and collaborates with healthcare providers, hospitals, and other facilities regarding clinical recommendations.	Practicing Registered Nurses, Public Health Nurses, Nurse Practitioners, Physician Assistants, Physicians	Practicing and Retired Registered Nurses, Public Health Nurses, Nurse Practitioners, Physician Assistants, Physicians, Medical Epidemiologists
Servers of Public Health Orders****	Serves public health orders for isolation (patients with COVID-19) or quarantine (contacts) as necessary for people who are noncompliant with public health recommendations to self-isolate or self-quarantine—either in-person or electronically.**	Public Health Investigators or other public health personnel with delegated authority	Public Health Personnel and other staff with delegated authority

*Suggested surge capacity workforce does not include all potential job classifications.

**Per jurisdictional protocols

***Also known as Communicable Disease Investigator, Communicable Disease Representative, Disease Intervention Technician.

****Jurisdiction-specific laws that provide authority for the local health department to issue legal orders for isolation of people diagnosed with infectious disease and quarantine of people who have been exposed to infectious disease. Local policies and procedures dictate the delegation of authority (e.g., officially deputized, acting on behalf of local health officer) and type of personnel who can serve legal orders.

Knowledge and Skills Needed for Case Investigation & Contact Tracing Staff

Case investigation and contact tracing are specialized skills. Knowledge and skills that staff may need include:

- A keen understanding of the need for patient confidentiality and the ability to conduct case interviews without violating confidentiality and to conduct contact tracing without disclosing the identity of the patient (case).
- Understanding of, and ability to explain, the medical terms associated with COVID-19 and principles of exposure, infection, infectious period, potentially infectious interactions, [symptoms](#) of disease, pre-symptomatic and asymptomatic infection, types of tests used to diagnose infection, and available prevention and control interventions (e.g., isolation/quarantine, social distancing, environmental surface cleaning).
- Excellent and tactful interpersonal skills, cultural sensitivity, and language and interviewing skills that allow them to build and maintain trust with patients and contacts.
- Basic skills of crisis counseling and the ability to confidently refer patients and contacts for further care, if needed.
- Resourcefulness in locating and communicating with patients and contacts who may be difficult to reach or reluctant to engage in conversation.
- Awareness of the sensitivities surrounding immigration status and how this can be a barrier to case investigation and contact tracing activities. Understanding that assurances should be made to patients and contacts that all information collected will be used exclusively for public health purposes and not shared with immigration authorities.
- Understanding of when to refer individuals or situations to medical, social, or supervisory resources.
- Ability to conduct environmental assessments of a patient’s or contact’s home, including the need for any social support during self-isolation/self-quarantine.
- Ability to collect basic standardized surveillance data per protocols.

- Understanding of when the use of public health legal authorities may be necessary and how to notify the appropriate public health officer for authorization.

The following cross-cutting knowledge, skills and abilities support the successful practice of case investigation and contact tracing. Recruitment for case investigators and contact tracers should focus on identifying people with these attributes:

- Ethical and professional conduct
- Active listening
- Open communication
- Critical thinking
- Negotiating skills
- Problem solving
- Cultural humility and competency
- Fluency in non-English languages for communities where English is not the primary language
- Emotional intelligence
- Flexibility and adaptability

Strong interpersonal skills are important, but the role of the case investigator also requires a higher level of acuity and training. The case investigator must be able to conduct a conversation-based investigation (as opposed to reading a script or data collection form) to obtain information on close contacts and to assess healthcare and support needs for people diagnosed with COVID-19.

Case Investigation & Contact Tracing Training

CDC has trained case investigators and contact tracers for over 40 years. Typically, training includes a blend of knowledge-based and skills-based coursework. Initial knowledge-based training covers disease-specific information, client-centered counseling and motivational interviewing techniques, assessment of risk and other social support needs, and approaches to facilitate confidential client communication. Initial skills-based training uses interview technique modeling, scripted language, case scenarios, and role-playing. These trainings are followed by on-the-job learning supported by experienced staff.

Similar techniques can be applied to the training of the COVID-19 surge workforce. All new staff mobilized to support case investigation and contact tracing will need a comprehensive overview of COVID-19 and the investigative process. Training for each of the case investigation and contact tracing roles should cover disease-specific information, interview guides, and protocols that include referral of high-risk individuals and complex cases to clinical staff, guidance on maintaining privacy/confidentiality, and referrals to support services, and should also include interactive skills-based training. CDC's website provides [COVID-19 Contact Tracing Training Guidance and Resources](#). Given the more nuanced work of the case investigator, staff conducting follow-up with patients with COVID-19 should be provided with a more intensive skills-based training. This should include special emphasis on enhancing their ability to navigate difficult conversations.

The urgency in standing-up the case investigation and contact tracing workforce requires that the training for COVID-19 be abbreviated. Therefore, supervisory structures should be put in place in state, territorial, local, and tribal health jurisdictions to provide guidance and mentorship for new trainees to ensure quality of practice.

Identifying Case Investigation & Contact Tracing Resources

Efforts are under way across the nation to recruit and train a case investigation and contact tracing workforce. This will take the coordination of federal, state, and local organizations as well as public-private partnerships where possible. Resources from each level will need to be woven together to create a blanket of support for case investigation and contact tracing within each community. Guidance and resources for state, tribal, local, and territorial health departments on staffing the public health workforce are [available from CDC](#).

The estimated number of case investigators and contact tracers needed in each community may be large and will vary depending on a number of factors, including the number of COVID-19 cases reported each day, number of close contacts elicited per patient, languages spoken in the community, and the amount of time and resources needed to notify and monitor patients and contacts. Local jurisdictions can review the guidance in [Appendix D](#) to estimate the number of case investigators/contact tracers needed in their community.

The surge workforce will likely come from a variety of sources:

- There may be local, state, and federal employees whose job can no longer be done due to COVID-19 who are available for redirection.
- Additionally, some local communities have identified volunteers who are willing and eager to support the COVID-19 response. Matching their knowledge, skills, and abilities with key roles in the COVID-19 response effort and providing relevant training can expand the workforce.
- Partnerships between public health and philanthropic entities can also expand the case investigation and contact tracing workforce by hiring and training individuals from local communities.
- Partnerships between public health and the technology sector can aid in the development of data management systems and innovations in communication.
- Finally, partnerships across all sectors can help support patients and contacts in need of housing and other support services during self-isolation and self-quarantine.

Alignment of Case Investigation & Contact Tracing Staff with Workflow

Combining large numbers of staff from different sources (e.g., local, state, federal) and varying categories (e.g., employees, contractors, temporary hires, volunteers) will be a challenge unique to the COVID-19 surge workforce. Consideration should be given to the alignment of staff assignments and supervision with workflow. For instance, those activities requiring knowledge of and access to public health surveillance systems (e.g., surveillance triage, case investigation) may be better integrated into the health department's workflow. Some jurisdictions have found it useful to mobilize a cadre of state case investigators to bolster local efforts in the event of clusters or outbreaks.

III. When to Initiate Case Investigation & Contact Tracing Activities

Case investigation and contact tracing activities should be implemented at two distinct points in an epidemic:

- First, early on in an epidemic, during the containment phase, case investigation and contact tracing are needed to stop transmission and prevent a large outbreak from occurring. If efforts to contain the epidemic are unsuccessful and widespread transmission occurs in the community, then stricter community mitigation measures (such as stay-at-home orders, business closures, etc.) must be implemented. If the strict mitigation measures are effective, transmission will begin to decline, and the community will enter a suppression phase.
- Second, once the community enters the suppression phase of the epidemic, the jurisdiction should begin to implement or scale up case investigation and contact tracing activities before the mitigation measures are fully lifted, in order to continue to reduce community transmission.

The decision to initiate or scale up COVID-19 case investigation and contact tracing activities will be unique to each area and will depend on the level of community transmission, characteristics of the community and their populations, and the local capacity to implement case investigation and contact tracing. It is critical that case investigation and contact tracing activities be adequately resourced and widely accepted in any community where they are implemented.

When to Suspend Case Investigation & Contact Tracing Activities

When a jurisdiction does not have the capacity to investigate a majority of its new COVID-19 cases, case investigation and contact tracing may not be the most effective approach. At that point, jurisdictions should consider suspending or scaling down contact tracing activities and reimplementing strict mitigation measures (such as stay-at-home orders, business closures, and school closures) until transmission begins to decline.

IV. Investigating a COVID-19 Case

Comprehensive information on a patient diagnosed with COVID-19 is the foundation of case investigation and contact tracing. This information includes the socio-demographic information, date of symptom onset or date of specimen collection for SARS-CoV-2 (the virus that causes COVID-19) testing, source of illness, list of close contacts and their locating information, duration of exposure, activity history during the contact elicitation window (when the patient was infectious and not under isolation), and exposure locations (including events/gatherings with unknown contacts).

Health departments are responsible for conducting COVID-19 case investigations and contact tracing and often have legal mandates to investigate cases of communicable disease and a duty to notify contacts of exposure. Health departments should initiate investigations as quickly as possible. Having written policies and procedures for investigations, including interview guides and call scripts, improves the efficiency and uniformity of investigations. In certain circumstances, it may take more than one interview with a patient to obtain all necessary and accurate information to complete the investigation.

Establishing trust and rapport between a case investigator and a patient diagnosed with COVID-19 is necessary to obtain information and ensure cooperation throughout the investigation. Good interview skills can be taught and will improve with practice. Public health personnel assigned to investigate patients with COVID-19 should be trained in interview methods and mentored by experienced employees. Case investigation and contact tracing training guidance and resources are [available](#), including suggestions for role-playing exercises for trainees.

A patient will ideally be interviewed by a case investigator who is fluent in their primary language. If this is not possible, health departments should provide interpretation services, ideally by an individual with an understanding of the patient's cultural background.

When possible and appropriate, case interviews and contact elicitation should be conducted via phone call or another distance-based application to ensure the safety of the case investigator and efficient use of program resources.

Step 1: Case Identification & Prioritization

COVID-19 case investigations are typically initiated when a health department receives a report from a laboratory of a positive SARS-CoV-2 test result or a report from a healthcare provider of a patient with a [confirmed](#) or [probable](#) diagnosis of COVID-19.

Ideally, jurisdictions will have ample testing available to facilitate laboratory confirmation of all COVID-19 cases within the community and the public health capacity to investigate all symptomatic and asymptomatic patients with a confirmed diagnosis of COVID-19.

Considerations when Laboratory Testing Capacity is Limited

For areas that have limited laboratory testing capacity, prioritization of testing resources should take into consideration the following factors: 1) ensuring optimal care for hospitalized patients and reducing the risk of healthcare-associated infections, 2) ensuring those at higher risk for severe disease are rapidly identified and triaged, 3) identifying individuals in communities experiencing high numbers of COVID-19 hospitalizations to decrease community spread and ensure the health of critical infrastructure workers.

CDC provides [recommended priorities for COVID-19 testing](#) that can be adapted by health departments to respond to rapidly changing local circumstances. *CDC's testing recommendations reinforce the role of case investigation and contact tracing as an effective strategy to decrease community transmission.*

Once a COVID-19 laboratory or provider report is received, this information will be entered into the health department surveillance system. With expanded laboratory testing in both public and private sectors, it is important to establish electronic laboratory reporting systems to enhance the timeliness of data to inform public health action.

The health department should use a triage system to use any information known about a patient diagnosed with COVID-19, prior to case interview, to delegate the investigation to either a case investigator or special infection control team (specific settings where a special team is needed are included in [Section VI](#)).

Health departments can communicate with healthcare providers by phone when a positive laboratory test is reported to obtain information necessary for triaging. Conversely, health departments could request that providers phone-in case information on the same day that a provider receives a positive SARS-CoV-2 test result in a Priority 1 or Priority 2 patient (see [Box 1](#)).

In addition to identifying potential outbreaks, information to assist in case prioritization includes a patient's COVID-19 symptoms, underlying health conditions, patient locating information (residence type/location/contact information), workplace role and location, confirmation that patient was notified of test result, and initiation of self-isolation.

Triage staff should have rapid turn-around times with provider queries (within 24 hours). Triage staff should then prioritize cases for investigation to either a case investigator or special infection control team based on known information. These strategies are only feasible with adequate staff to provide triage support and sufficient patient information available to allow for prioritizing.

For areas that have limited public health resources to investigate all cases, the following case investigation hierarchy ([Box 1](#)) can be used to help guide prioritization when information is known about the case. The hierarchy is based on the assumption that patients with a confirmed or probable diagnosis of COVID-19 in Priority 1 are likely to have exposed a larger number of people and/or are likely to have close contacts who could potentially expose many people, those at higher risk for severe disease, or critical infrastructure workers. Priority 2 includes patients who may be at higher risk for severe disease and will need prompt risk assessment and linkage to any needed medical and support services. Patients should be prioritized based on the highest priority category they fall into.

When prioritizing patients with a positive SARS-CoV-2 test result or a probable diagnosis of COVID-19 to investigate, jurisdictions should be guided by the local characteristics of disease transmission, demographics, and public health and healthcare system capacity. Decisions should be supported by local guidance and circumstances.

Box 1. COVID -19 Case Investigation Hierarchy

All confirmed and probable COVID-19 cases should be investigated. When resources are limited, priorities for who should be investigated are listed below. **Priority 1 patients** are likely to have exposed a larger number of people and/or are likely to have close contacts who could potentially expose: many people, those at higher risk for severe disease, or critical infrastructure workers. **Priority 2 patients** may be at higher risk for severe disease and will need prompt risk assessment and linkage to any needed medical and support services.

INVESTIGATE PATIENTS WITH A CONFIRMED OR PROBABLE DIAGNOSIS WHO ARE:

PRIORITY 1

- Hospitalized patients
- Healthcare personnel (HCP)
- First responders (e.g., Emergency Medical Services (EMS) personnel, law enforcement, firefighters)
- Individuals living, working or visiting acute care, skilled nursing, mental health, and long-term care facilities
- Individuals living, working or visiting community congregate settings (e.g., correctional facilities, homeless shelters, educational institutions, mass gatherings, and crowded workplaces including production plants)
- Members of a large household living in close quarters
- Individuals known to live in households with a higher risk individual or to provide care in a household with a higher risk individual

PRIORITY 2

- [Critical infrastructure workers](#)*
- Individuals 65 years of age and older
- Individuals at [higher risk for severe disease](#)
- Pregnant women

PRIORITY 3

- Individuals **with** [symptoms](#) who do not meet any of the above categories
- Deceased cases

PRIORITY 4

- Individuals **without** symptoms who do not meet any of the above categories

****Consider moving to Priority 1 any critical infrastructure worker who works closely with other critical infrastructure workers and/or is in close contact with large numbers of people (e.g., transportation, food service).***

Operational Questions to Consider

- How are reports received and how are they entered into the database? How complete are the reports?
- Can electronic laboratory reporting for COVID-19 cases be easily implemented?
- How will the time between a patient's symptom onset and self-isolation be assessed? How can delays in laboratory or case reporting, assignment to case investigator, time to patient interview and subsequent isolation be monitored?

- How will non-laboratory-confirmed cases be reported by providers and managed by the health department? Will this require a modification of provider reporting requirements and confidential morbidity report forms?
- How will public health staff coordinate with healthcare providers to facilitate testing of probable cases?
- Can laboratory and provider reporting requirements be altered to alert local and state health departments of critical data elements to aid in prioritization?
- Can you develop public health alerts to request that providers report probable cases and cases in Priority 1 patients ([Box 1](#)) within 24 hours?
- What type of collaborative agreements can be set in place for data sharing between public health and healthcare providers (e.g., access to electronic health records)?
- For areas with blended state, regional and/or local health department authorities, which entity will be responsible for case prioritization?
- How will investigations be handled for a patient who regularly travels between jurisdictions?

Step 2: Rapid Notification of Results or Diagnosis

- Some patients will have been notified of their positive SARS-CoV-2 test result or probable case diagnosis by their healthcare provider and already received [instructions for self-isolation](#).
- When communication with the patient about their positive SARS-CoV-2 test result or probable diagnosis is unclear or has not been taken place, the health department should notify the patient as soon as possible (within 24 hours of reporting to the health department).
- Ideally, a patient with a probable COVID-19 diagnosis will be linked to testing (if available and appropriate).
- If there is a need for testing and the case investigator plans to collect the specimen in person, case investigators need to have had appropriate training on infection prevention and control practices. They must also obtain any necessary personal protective equipment (PPE) prior to conducting in-person activities.
- The first connection can be made through different channels such as phone, text, email or in-person (if appropriate) in the primary language of the individual. This process can be manual, automated, or semi-automated based on jurisdictional capacity. Protocol should clearly outline the primary and secondary means of reaching a patient and address confidentiality at the start of communication.
- Special considerations should be given to ensure culturally and linguistically appropriate communication.
- Protocols should be in place to provide services to people who are deaf or who have hearing loss.
- Depending on the source of the case report, information for locating a patient may be insufficient. Tips on additional resources that may be used to obtain missing locating information can be found in [Appendix B](#). Every effort should be made to reach the patient remotely before attempting in-person communication.

Operational Questions to Consider

- How can your jurisdiction incorporate existing or new technology into a case investigator's workflow to expedite patient notification?
- What technological precautions can be taken to ensure the confidentiality of patients and case investigators?
- What process will be followed when the patient is a minor? *Review jurisdiction-specific laws and consult with legal counsel if uncertain.*
- When is in-person notification needed? *Case investigators expected to perform in person notification need appropriate training on infection prevention and control practices and must obtain any necessary personal protective equipment (PPE) prior to conducting in-person activities.*
- How will positive test notifications be handled in congregate facilities (e.g., correctional facilities, skilled nursing facilities, assisted care facilities, mental health facilities, various workplaces) where a positive test has implications for the patient, other residents, staff and visitors?
- How will investigations be handled for patients who are hospitalized and unable to be interviewed or deceased?
- What are local policies regarding interviewing of surrogates/proxies?

Step 3: Case Interview

- Every effort should be made to interview the patient by telephone or video conference instead of in-person. For in-person interviews, guidance on recommended infection prevention and control practices at a home or non-home residential setting can be found on [CDC's Evaluating PUIs Residential page](#).
- Patients in special populations and/or congregate settings may require additional considerations and should be triaged and assigned to a special infection control team. See [Section VI](#) for additional information.
- [Appendix C](#) includes critical data elements that can be incorporated into a jurisdiction's paper form or electronic system used to elicit detailed information about a patient's close contacts and activity history, including any household contacts during self-isolation.

Operational Questions to Consider

- If the patient needs to be interviewed via an interpreter, how will those services be accessed?
- What steps will be taken if the patient is unwilling to communicate remotely (e.g., phone, video conference)?
- What procedures will be established to interview patients in correctional facilities? Hospitalized patients? Minors?
- What procedures will be established to locate and interview people experiencing homelessness?

Step 3a: Monitoring and Isolation Instructions

- Patients with probable or confirmed COVID-19 should be advised to self-isolate immediately, if they are not doing so already. *Self-isolation is recommended for people with probable or confirmed COVID-19 who have mild illness and are able to recover at home.*
- It should be made clear to the patient whether the isolation instructions are voluntary or mandatory.

- If a patient refuses to comply with voluntary isolation instructions, state and local jurisdictions have the authority to mandate isolation.
- The patient should be informed of COVID-19 symptoms to monitor for and be instructed to get medical attention immediately if he/she has any [emergency warning signs](#) (including trouble breathing). Patients with no primary healthcare provider will need linkage to telemedicine or phone consultation.
- The patient should also be informed of ways to [prevent infection](#) among those living in their household.
- Additional self-isolation guidance should be reviewed with the patient and instructional materials provided. Sample materials can be found on the CDC website:
 - [10 things you can do to manage your COVID-19 symptoms at home](#)
 - [What to Do If You Are Sick](#)
- All instructions should be provided in a patient’s primary language.

Operational Questions to Consider

- Under what circumstances will isolation be mandatory (under public health orders) as opposed to voluntary? How will this distinction be made clear to a patient?
- How will patients be monitored for isolation compliance?
- In the event that self-isolation is not feasible, what alternative supports exist, and/or what risk-reduction measures can be taken?

Step 3b: Assessing Self-Isolation Support Needs

Emphasis should be placed on conducting an environmental assessment of the patient’s self-isolation location, as this will identify any need for social support during self-isolation.

Self-Isolation of patients with a diagnosis of COVID-19 prevents transmission to others and is critical to the success of any case investigation and contact tracing efforts. For most patients diagnosed with COVID-19 (i.e., those in an outpatient setting who are medically stable or discharged home following diagnosis at hospital), self-isolation can take place at home. [If possible, patients should be asked to voluntarily stay home, monitor themselves, and maintain social distance from others.](#) The timeframe for self-isolation varies by case but, in general, people should isolate until the risk of secondary transmission is considered low. Adherence to self-isolation instructions mainly depends on the patients’ needs and their living situation, as well as on the support provided by the case investigation and contact tracing team.

Self-isolation requires that patients remain separate from others in the home, staying in a specific room away from other people and pets, and ideally with access to a separate bathroom. First and foremost, a case investigator should assess a patient’s ability to self-isolate in a safe environment that provides access to a private room and bathroom, as well as access to adequate food and water, among other considerations. For a portion of the US population, self-isolation at home will be a challenge. It may be particularly difficult for some of the most vulnerable populations. Considerations must also be made for patients who express fear of abuse or violence if they must self-isolate at home. Additionally, some patients (e.g., single parents, nursing mothers, parents with children and toddlers, and other primary caregivers) may face other challenges, such as childcare or dependent adult care, that may affect their ability to self-isolate. Social services, housing and other supportive services will be needed for those patients who are unable to separate themselves from others in their current living situation. See [Section XI](#) of this guidance for further considerations.

Patients will also need to be supported with health coaching to ensure daily monitoring of temperature and COVID-19 symptoms, and have access to clinical services for medical concerns. Coordination of access to telehealth services may be needed for patients without virtual access to a primary care provider. Reminding patients about the emergency warning signs and contact information for healthcare providers is imperative to ensure early medical management in the event that they develop new symptoms or their symptoms worsen.

All patients with a confirmed or probable diagnosis of COVID-19 who are entering self-isolation in a non-healthcare setting ideally would be provided a COVID-19 kit with the following resources*:

- Washable cloth face covering
- Gloves
- Digital thermometer
- Alcohol-based hand sanitizer, soap, EPA-registered household disinfectant
- COVID-19 health education materials (translated into the appropriate language)
- Instructions for [cleaning and disinfecting your home](#) for those sharing space with others
- A hotline/warmline to address any support needs during the self-isolation period, including medical support

*The composition of the COVID-19 kit will depend on the jurisdiction's resources.

Operational Questions to Consider

- Are there other resources that your jurisdiction can share to provide health advice and answer questions? (e.g., mobile app, [CDC Coronavirus Symptom Self-Checker](#), [CDC-INFO](#))
- Who can you partner with to provide other services to support patients during self-isolation?

Step 3c: Eliciting Contacts

- Contact elicitation is a voluntary and critical part of the case interview.
- The case investigator can use information from any reports received by the health department, along with the patient's symptom history gathered earlier in the case interview, to determine the contact elicitation window (the timeframe when the patient was infectious and not under isolation). See [Box 2](#) below for additional guidance on determining the contact elicitation window.
- A [close contact](#) is defined as someone who was within 6 feet of an infected person for at least 15 minutes starting from 48 hours before illness onset (or, for asymptomatic patients, 14 days prior to positive specimen collection) until the time the patient is isolated.
- It will be important that the case investigator clearly explain why close contacts are being elicited and assure the patient that their identity will not be disclosed to any close contacts that they identify.
- The trust and rapport built earlier in the case interview, combined with open-ended and probing questions, will help facilitate the contact elicitation portion of the interview.
- Information to be gathered for each close contact can be found in the Contact Elicitation Investigation data elements table in [Appendix C](#) and includes the contact's name and locating information, the setting of the exposure, contact's work setting and occupation, and any underlying health conditions or other risk factors the contact may have (if known by the patient).
- In communities near international land borders, specific interview questions should be asked to identify relevant contacts across the border.
- The case investigator should also confirm the best way to reach the patient for any follow-up discussion.
- **Proxy interviews** are essential when the patient cannot be interviewed (e.g., patient is deceased, intubated, unconscious, a minor, cognitively impaired). Key proxy informants are those likely to know the patient's practices, habits, and behaviors. However, because proxy interviews jeopardize patient

confidentiality, jurisdictions should establish clear guidelines for these interviews that recognize the challenge of maintaining confidentiality.

Box 2. Determining the Contact Elicitation Window

In order to elicit contacts from a confirmed or probable COVID-19 patient, a case investigator will first need to determine the appropriate contact elicitation window. An assessment of the patient's COVID-19 symptoms will help identify their infectious period. Building on that information, the contact elicitation window is the timeframe when the patient was infectious and not under isolation. If there are additional contacts during isolation (such as household contacts), those contacts should also be elicited.

Patient with Confirmed or Probable COVID-19 – Symptomatic

When interviewing a symptomatic patient, a case investigator should elicit all [close contacts](#) from 48 hours prior to onset of any symptoms through the beginning of isolation.

Start date: 48 hours before symptom* onset

End date: Beginning of isolation period OR until [discontinuation of home isolation](#) (to elicit household contacts of patients recovering at home)

*[All possible symptoms](#) should be considered, with particular attention to those that may be mild and/or nonspecific (e.g., fatigue, muscle pain) and those less common.

Patient with Confirmed or Probable COVID-19 – Asymptomatic

Determining the contact elicitation window for an asymptomatic patient is challenging and should be considered an estimate instead of a precise timeframe. Rather than focusing on the suggested start date, a case investigator may want to prioritize eliciting any recent close contacts in higher priority groups (as listed in [Box 4](#)).

Start date: 14 days before the date of specimen collection for confirmed laboratory test

End date: Beginning of isolation period OR [discontinuation of home isolation](#) (to elicit household contacts of patients recovering at home)

Operational Questions to Consider

- How can your jurisdiction use technology to facilitate contact elicitation (e.g., download contact list from a patient's phone)?
- What types of data tools would help increase efficiency?
- How will case investigators document and transfer the list of contacts to the contact tracer?
- Will patients be asked to notify household contacts or close contacts themselves? How will patient-notified contacts be managed and dispositioned?
- If an employer knows the identity of an employee diagnosed with COVID-19, how can a list of close contacts from the worksite best be gathered?

Step 4: Case Follow-Up & Medical Monitoring

- The initial patient interview covers a great deal of material, which can be overwhelming for a patient.
- In some instances, the case investigator may need to follow-up with the patient to clarify details from the conversation including:
 - Onset of symptoms, particularly the nonspecific symptoms (e.g., fatigue, muscle pain);
 - Further exploration of occupation and interactions in the workplace or last day at work;
 - Transportation to and from work, social and recreational activities;
 - Additional locating information for close contacts or additional contacts from their self-isolation period;
 - Home, family, and other factors that could impact compliance with self-isolation.
- Ideally, all patients diagnosed with COVID-19 will be monitored using real-time communication methods (e.g., telephone call, video conferencing) to share daily reports on their temperature and COVID-19 symptoms throughout the length of their self-isolation.
- Prioritizing which patients to monitor closely and which may be able to adequately self-monitor should be determined in the context of existing resources. In some instances, patients with underlying health conditions and other special circumstances (such as pregnancy) may present complex medical challenges. While these may not require hospitalization, these patients may need in-home medical monitoring by a healthcare provider until their COVID-19 symptoms resolve.
- If a jurisdiction's resources do not allow for active daily monitoring, patients will be asked to self-monitor and communicate remotely (e.g., email, recorded video, telephone message, text, monitoring apps) to notify public health authorities of their health status and promptly communicate any new symptoms or symptoms of increasing severity.
- For those individuals self-monitoring and sharing reports remotely, reports must be received by the agreed upon time each day, and protocol must address follow-up actions for patients who do not report out.

Operational Questions to Consider

- What types of tools and schedules will be used for medical monitoring?
- Which staff in the jurisdiction will conduct medical monitoring? Will certain cases be delegated to a staff member with clinical expertise (e.g., complex or high-risk cases)?
- What social support is necessary for a patient to maintain self-isolation? What support may a patient's family need?
- What criteria will your jurisdiction use to refer patients to healthcare or emergency services?
- What steps will be taken for self-monitoring patients who do not comply with reporting requirements? How intensive will the outreach be (e.g., same-day home visit)?

Step 5: Additional Case Follow-Up

- Additional follow-up may be needed for patients with COVID-19 who are transitioning from one facility to another—for example, from a hospital to a long-term care facility or to home isolation. Care coordination plans should be put in place to maintain proper infection control and isolation procedures.
- Additional coordination will also be necessary to support patients with COVID-19 who are discharged from a correctional facility (e.g., prisons, jails, youth detention centers). These individuals will be transitioning to self-isolation in their home communities and will need assessment for social supports to ensure adequate housing, food, and medical care throughout the remainder of their self-isolation.

- Transitional case management plans are incredibly important to ensure continuity of care for patients with COVID-19 and protect the community from further transmission.

Step 6: Discontinuation of Self-Isolation

- The decision to [discontinue self-isolation](#) is made on a case-by-case basis, taking into consideration a patient's COVID-19 test results, symptom history and other factors, including occupation.
- CDC guidance included in [Box 3](#) provides a framework for decision-making. However, decisions are determined at the local level and should be communicated clearly to a patient.
- Decisions about return to work for healthcare providers with confirmed or suspected COVID-19 should be made in the context of local circumstances. [CDC guidance](#) is available to help occupational health programs and public health officials make these decisions.

Box 3. Criteria for Ending Isolation if Not in a Healthcare Setting

People with COVID-19 or its symptoms who are recovering at home (or other non-hospital setting), and

will not be tested

will be tested

to determine if they are no longer contagious, can leave their “sick room” and home when:

- They have had no fever for at least 72 hours (that is 3 full days of no fever) **without** the use of medicine that reduces fevers
- AND**
- Other symptoms have improved (for example, when their cough or shortness of breath have improved)
- AND**
- At least 10 days have passed since their symptoms first appeared

- They no longer have a fever (**without** the use of medicine that reduces fevers)
- AND**
- Other symptoms have improved (for example, when their cough or shortness of breath have improved)
- AND**
- They received two negative tests in a row, 24 hours apart

People who DID NOT have COVID-19 symptoms, but tested positive who:

will be tested again

will not be tested again

to determine if they are no longer contagious, can leave their “sick room” and home when:

- At least 10 days have passed since the date of the first positive test
- AND**
- They continue to have no symptoms (no cough or shortness of breath) since the test

- They received two negative tests in a row, at least 24 hours apart

Operational Questions to Consider

- Will a “return to work” letter be available to patients who request one after completing their self-isolation period?
- Will a warmline be offered to address any follow-up issues?

V. Contact Tracing for COVID-19

Summary of COVID-19 Specific Practices

- Contact tracing will be conducted for [close contacts](#) (any individual within 6 feet of an infected person for at least 15 minutes) of **confirmed or probable COVID-19 patients**.
- Remote communications for the purposes of case investigation and contact tracing should be prioritized; in-person communication may be considered only after remote options have been exhausted.
- Testing is recommended for all close contacts of **confirmed or probable COVID-19 patients**.
- Those contacts who test positive (symptomatic or asymptomatic) should be [managed as a confirmed COVID-19 case](#).
- Asymptomatic contacts testing negative should self-quarantine **for 14 days from their last exposure** (i.e., close encounter with confirmed or probable COVID-19 case)
- If testing is not available, **symptomatic** close contacts should self-isolate and be [managed as a probable COVID-19 case](#).
- If testing is not available, **asymptomatic** close contacts should self-quarantine and be monitored for 14 days after their last exposure, with linkage to clinical care for those who develop symptoms.

For COVID-19, a [close contact](#) is defined as any individual who was within 6 feet of an infected person for at least 15 minutes starting from 48 hours before illness onset until the time the patient is isolated.

The public health evaluation of close contacts to patients with confirmed or probable COVID-19 may vary depending on the exposure setting. Contacts in special populations and/or congregate settings require additional considerations and may need handoff to a senior health department investigator or special team. Additional guidance on managing these contacts can be found in [Section VI](#) of this guidance.

[Close Contact Evaluation and Monitoring Priorities](#)

In jurisdictions with testing capacity, symptomatic and asymptomatic close contacts to patients with confirmed and probable COVID-19 should be evaluated and monitored. For areas with insufficient testing support and/or limited public health resources, the following evaluation and monitoring hierarchy ([Box 4](#)) can be used to help guide prioritization. The hierarchy is based on the assumption that if close contacts listed in Priority 1 *become infected*, they could potentially expose many people, those at higher risk for severe disease, or critical infrastructure workers. If close contacts in Priority 2 *become infected*, they may be at higher risk for severe disease, so prompt notification, monitoring, and linkage to needed medical and support services is important.

When prioritizing close contacts to evaluate and monitor, jurisdictions should be guided by the local characteristics of disease transmission, demographics, and public health and healthcare system capacity. Some states require mandatory testing for specific circumstances. Local decisions depend on local guidance and circumstances.

Box 4. Close Contact Evaluation and Monitoring Hierarchy

EVALUATE/MONITOR CLOSE CONTACTS WHO ARE:

PRIORITY 1

- Hospitalized patients
- Healthcare personnel (HCP)
- First responders (e.g., EMS, law enforcement, firefighters)
- Individuals living, working or visiting acute care, skilled nursing, mental health, and long-term care facilities
- Individuals living, working or visiting community congregate settings (e.g., correctional facilities, homeless shelters, educational institutions, mass gatherings, and workplaces including production plants)
- Member of a large household living in close quarters
- Individuals who live in households with a higher risk individual or who provide care in a household with a higher risk individual (Note: Household members who likely had extensive contact with a patient with COVID-19 should constitute the highest risk close contacts.)

PRIORITY 2

- [Critical infrastructure workers](#)*
- Individuals 65 years of age and older
- Individuals at [higher risk for severe disease](#)
- Pregnant women

PRIORITY 3

- Individuals **with** [symptoms](#) who do not meet any of the above categories

PRIORITY 4

- Individuals **without** symptoms who do not meet any of the above categories

****Consider moving to Priority 1 any critical infrastructure worker who works closely with other critical infrastructure workers and/or is in close contact with large numbers of people (e.g., transportation, food service).***

Contact tracers use clear protocols to notify, interview, and advise close contacts to patients with confirmed or probable COVID-19. Jurisdictions can use the following steps and considerations as a framework when developing a protocol for the tracing of close contacts.

Step 1: Rapid Notification of Exposure

For contacts in your health department's jurisdiction:

- A close contact to a patient with confirmed or probable COVID-19 should be notified of their exposure as soon as possible (within 24 hours of contact elicitation). The patient may elect to notify some or all of their close contacts before the contact tracer.
- *The identity of the patient will not be revealed or confirmed by the contact tracer, even if asked by a contact.*
- Contacts can be notified through different channels such as phone, text, email, or in-person (if appropriate) in the primary language of the individual. Special consideration should be given to ensure culturally and linguistically appropriate communications. The protocol should clearly outline the primary and secondary means of notifying a contact.

- Protocols should be in place to provide services to people who are deaf or who have hearing loss.
- Depending on the information elicited during the case investigation, locating information for the contact may be insufficient. Tips on additional resources that may be used to obtain missing locating information can be found in [Appendix B](#). Every effort should be made to reach the contact remotely before attempting in-person communication.

Operational Questions to Consider

- Who will conduct contact notification in your jurisdiction? (e.g., case investigators, other public health staff, volunteers, contracted staff)
- How will you collaborate to transfer contact information from one jurisdiction to another to ensure notification of exposure for contacts outside of your jurisdiction?
- How can your jurisdiction incorporate existing or new technology (e.g., mobile app) into a contact tracer’s workflow to speed up contact notification?
- When is in-person notification needed? *Contact tracers expected to perform in-person notification need appropriate training on infection prevention and control practices and must obtain any necessary PPE prior to conducting in-person activities.*
- Will contact tracers be asked to notify a patient’s household contacts/known contacts, or will the patient be asked to make these notifications?
- How will notification of exposure be handled for minors?
- If an entire household is exposed, will there be one point of contact for the household or separate contacts for every household member?
- How will a contact tracer follow up with a contact if the patient makes the notification?
- How will you work with employers when many contacts are within a work setting?

Step 2: Contact Interview

- Every effort should be made to interview the close contact by telephone, text, or video conference instead of in-person. The interview should be conducted in the individual’s primary language (through interpretation services, if necessary). For in-person interviews, guidance on recommended infection prevention and control practices at a home or non-home residential setting can be found on [CDC’s Evaluating PUIs Residential page](#).
- [Appendix C](#) includes critical data elements that can be incorporated into a jurisdiction’s form used to interview contacts to assess symptoms, better characterize their underlying risk for infection, and assess home and social factors that could impact compliance with self-quarantine.

Operational Questions to Consider

- If a contact needs to be interviewed via an interpreter, how will those services be accessed?
- How will your jurisdiction navigate confidentiality challenges when the calendar date of an exposure easily reveals who may have exposed a contact to COVID-19?
- What steps will be taken if a contact is unwilling or unable to be interviewed or cannot be located?

Step 2a: Testing and Quarantine/Isolation Instructions

- Close contacts with symptoms should immediately self-isolate and be referred for testing and medical care. Contacts with no primary healthcare provider will need linkage to telemedicine or phone consultation.

- Close contacts with no symptoms will be asked to self-quarantine for 14 days from their last potential exposure. The last potential exposure would initially be determined by the case investigator.
- If resources permit, jurisdictions should arrange for the testing of all close contacts, as appropriate.
 - If positive, the contact will be referred to a case investigator.
 - If negative, asymptomatic close contacts should continue to self-quarantine for a full 14 days after last exposure and follow all recommendations of public health authorities.
 - If negative, symptomatic close contacts should continue to self-quarantine and follow all recommendations of public health authorities. A second test and additional medical consultation may be needed if symptoms do not improve.
 - If testing is not available, symptomatic close contacts should be advised to self-isolate and be managed as a probable case. *Self-isolation is recommended for people with probable or confirmed COVID-19 who have mild illness and are able to recover at home.*
- Contacts should be educated about COVID-19 symptoms to monitor for and be instructed to promptly report any new symptoms to public health authorities and seek medical care when [necessary](#).
- [CDC guidance](#) is available on critical infrastructure workers who may have had exposure to a person with suspected or confirmed COVID-19. To ensure continuity of operations of essential functions, CDC advises that critical infrastructure workers may be permitted to continue working following potential exposure to COVID-19, provided they remain asymptomatic and additional precautions are implemented to protect them and the community. Any decisions should be made in the context of local circumstances.
- [CDC guidance](#) is also available on asymptomatic healthcare providers with a recognized COVID-19 exposure. They might be permitted to work in a crisis capacity strategy to address staffing shortages if they wear a facemask for source control for 14 days after the exposure. Any decisions should be made in the context of local circumstances.

Sample Instructions for Close Contacts

- [Self-quarantine](#), preferably at home, until 14 days after last potential exposure and maintain social distance (at least 6 feet) from others at all times.
- Follow [CDC guidance](#) on self-quarantine.
- Self-monitor daily for [symptoms](#) [NOTE: Include instructions on how close contacts can report symptoms to the health department and agreed upon reporting times.]
 - If you have a thermometer, check and record your temperature twice a day.
 - Contact a healthcare provider immediately if you:
 - Feel feverish or have a temperature of 100.4°F or higher
 - Develop a cough or shortness of breath
 - Develop mild symptoms like sore throat, muscle aches, tiredness, or diarrhea
- Avoid contact with [people at higher risk for severe illness](#) (unless they live in the same home and had same exposure as you).
- Follow [CDC guidance](#) if you develop symptoms.

Operational Questions to Consider

- Under what circumstances will quarantine be mandatory (under public health orders) as opposed to voluntary?
- Who will be referred for testing (e.g., symptomatic, asymptomatic) and how (e.g., testing site, home test kit)?
- How will contacts be checked against databases of already confirmed cases to ensure they are not already in self-isolation?
- Will contact tracers be collecting diagnostic respiratory specimens?

- How will contacts be monitored for self-quarantine compliance?
- What services are available in the community to support workers who need to stay home and self-quarantine?
- How can your jurisdiction incorporate technology, such as a mobile app or online tool, to assist with active monitoring of close contacts (e.g., symptom reporting, temperature checks)?
- Can your jurisdiction supply a letter/email to close contacts documenting their need to self-quarantine for a specified date range? Contacts could provide this to their employers to verify the reason for a work absence.

Step 2b: Assessing Self-Quarantine Support Needs

Emphasis should be placed on conducting an environmental assessment of the contact's self-quarantine location, as this will identify any need for social support during self-quarantine.

Self-quarantine of close contacts exposed to COVID-19 prevents transmission to others and is critical to the success of case investigation and contact tracing efforts. For most, self-quarantine can take place at home. If possible, contacts should be asked to voluntarily stay home, monitor themselves, and maintain social distance from others. The timeframe for self-quarantine is 14 days following the last day of exposure to a patient with COVID-19, to ensure that the contact does not get sick themselves and spread the virus to others. Adherence to self-quarantine instructions may depend on the support provided to contacts.

Self-quarantine requires that a contact remain in a specific room separate from other non-exposed people and pets in the home, and ideally with access to a separate bathroom. First and foremost, the contact tracer should assess an individual's ability to self-quarantine in a safe environment that provides access to a private room and bathroom, as well as access to adequate food and water among other considerations. For a portion of the US population, self-quarantine at home will be a challenge. It will be particularly difficult for some of the most vulnerable populations.

Considerations must also be made for close contacts who express fear of abuse or violence if they must self-quarantine at home. Additionally, some contacts (e.g., single parents, nursing mothers, parents with children and toddlers, and other primary caregivers) may face other challenges, such as childcare or dependent adult care, that may affect their ability to self-quarantine. Social services, housing and other supportive services will be needed for those contacts who are unable to separate themselves from others in their current living situation. See [Section XI](#) of this guidance for further considerations.

Close contacts will also need to be supported with health coaching to ensure daily monitoring of temperature and the onset of any COVID-19 symptoms and have access to clinical services should symptoms appear. Coordination of access to telehealth services may be needed for contacts without virtual access to a primary care provider. All close contacts entering a 14-day self-quarantine period should be provided a COVID-19 kit with the following resources*:

- Washable cloth face covering
- Gloves
- Digital thermometer
- Alcohol-based hand sanitizer, soap, EPA-registered household disinfectant
- COVID-19 health education materials (translated into the appropriate language)
- Instructions for [cleaning and disinfecting your home](#) for those sharing space with others

- A hotline/warmline to address any support needs during the self-quarantine period, including medical support

*The composition of the COVID-19 kit will depend on the jurisdiction's resources.

Operational Questions to Consider

- Are there other resources that your jurisdiction can share to provide health advice and answer questions? (e.g., mobile app, hotline/call center, CDC Coronavirus Symptom Self-Checker, [CDC-INFO](#))

Step 3: Medical Monitoring

- Contacts who agree to self-quarantine will ideally receive active daily monitoring through real-time communication methods (e.g., telephone calls, video conferencing) to check-in on their temperature and COVID-19 symptoms throughout the length of their self-quarantine.
- If a jurisdiction's resources do not allow for active daily monitoring, contacts will be asked to self-monitor and communicate remotely (e.g., email, recorded video, telephone message, text, monitoring apps) to notify public health authorities of their health status and promptly communicate any new symptoms or symptoms of increasing severity.
- For those individuals self-monitoring and sharing reports remotely, reports must be received by the agreed upon time each day, and protocol must address follow-up actions for contacts who do not report out.
- Contacts who develop and report symptoms will be linked to clinical care and testing. For contacts who report testing, follow up to confirm results.
 - If positive, the contact will be referred to a case investigator.
 - If negative, symptomatic contacts should continue to self-quarantine and follow all recommendations of public health authorities. A second test and additional medical consultation may be needed if symptoms do not improve.
 - If testing is not available, symptomatic close contacts should be advised to self-isolate and be managed as a probable case. *Self-isolation is recommended for people with probable or confirmed COVID-19 who have mild illness and are able to recover at home.*

Operational Questions to Consider

- What steps will be taken for contacts under self-monitoring who do not report as required? How intensive will the outreach be (e.g., same-day home visit)?

Step 4: Contact Close Out

- Contacts who remain asymptomatic for 14 days after last exposure can be notified of their release from monitoring and provided general health education in their primary language.
- Contacts who develop symptoms but test negative during their monitoring period should continue to self-quarantine and follow all recommendations of public health authorities. A second test and additional medical consultation may be needed if symptoms do not improve. The decision to release a contact from self-quarantine should be determined at the local level and should be communicated clearly to the contact.

Operational Questions to Consider

- Will the health department send an alert notification to the individual one day prior to the end of self-quarantine to double-check signs/symptoms and authorize return to work?
- Will a “return to work” letter be available to contacts who request one after completing the monitoring period?
- Will a warmline be offered to address any post-monitoring issues?

VI. Outbreaks

Most jurisdictions will create a special investigation team to take over outbreaks as they require expertise and resources beyond typical case investigation and contact tracing efforts. CDC has developed specific guidance for investigating patients with COVID-19 in a number of settings. When relevant, the CDC guidance is highlighted below.

A COVID-19 outbreak indicates potentially extensive transmission within a setting or organization. An outbreak investigation involves several overlapping epidemiologic, case, and contact investigations, with a surge in the need for public health resources. More emphasis on active case finding is recommended, which can result in more contacts than usual needing testing and monitoring.

Definitions for COVID-19 outbreaks are relative to the local context. A working definition of "outbreak" is recommended for planning investigations. A recommended definition is a situation that is consistent with either of two sets of criteria:

- During (and because of) a case investigation and contact tracing, two or more contacts are identified as having active COVID-19, regardless of their assigned priority.

OR

- Two or more patients with COVID-19 are discovered to be linked, and the linkage is established outside of a case investigation and contact tracing (e.g., two patients who received a diagnosis of COVID-19 are found to work in the same office, and only one or neither of the them was listed as a contact to the other).

Typically, jurisdictions will require potential outbreaks to be investigated by a special team of experts. An outbreak increases the urgency of investigations and places greater demands on the health department. In an outbreak, contacts can be exposed to more than one patient diagnosed with COVID-19, and patients and contacts can be interrelated through multiple social connections, which complicate efforts to set priorities.

Congregate Settings

For congregate settings, the types of information for designating priorities are site-specific, and therefore a customized algorithm is required for each situation. The general concepts of patient characteristics, duration and proximity of exposure, environmental factors that affect transmission, and susceptibility of contacts to COVID-19 should be considered. These investigations are extremely complex and will require collaboration with multiple partners in order to assess risk for both facility residents, staff, and external contractors who provide services in those facilities. Symptom screening, testing, and isolation and quarantine recommended may vary based on the facility (e.g., healthcare facility versus others), the environmental constructs, and the number of patients with COVID-19 and contacts under consideration.

In some instances, case investigation and contact tracing conducted within facilities will need to be undertaken by specially trained staff (e.g., infection control practitioners, industrial hygienists) in collaboration with facility leadership, occupational health liaisons and other relevant SMEs. Interruption of transmission within the facilities will also require complementary community case investigation and contact tracing efforts, so planning for these activities should be a joint endeavor involving community leadership and other key stakeholders.

The information below provides a snapshot of areas for consideration and links to available CDC guidance.

Correctional Facilities

CDC has issued [guidance](#) on preventing and controlling COVID-19 in correctional facilities. Jails, prisons, and immigrant detention centers have reported COVID-19 outbreaks. Multiple factors can hinder contact tracing in correctional facilities. The best preparation for conducting case investigation and contact tracing in jails, prisons, and immigration centers is a preexisting formal collaboration between correctional and public health officials. Health department TB, HIV, and STD programs have long-standing relationships with correctional facilities and can be seen as a resource. If a collaboration has not been established prior to an outbreak, quickly developing relationships with correctional partners will be critical. Building trust with people held in the facilities will also be necessary to successfully investigate the outbreak.

Investigations in jails can be particularly challenging because of rapid turnover of inmates and crowding. The number of contacts in close proximity to a patient/inmate can be large. Contacts who are transferred, released, or paroled from a correctional facility before being evaluated for COVID-19 should be traced.

Workplaces

CDC has [resources](#) for businesses and workplaces, including [guidance](#) on how to prevent COVID-19 in the workplace. Duration and proximity of exposure can be greater than for other settings. Details regarding employment, hours, working conditions, and workplace contacts should be obtained during the initial interview with the patient, and the workplace should be toured after accounting for confidentiality and permission from workplace administrators or managers. If the employer has occupational health professionals/program, they should be included in the walkthrough and engaged throughout the investigative process.

Employee lists are helpful for identifying contacts, but certain employees might have left the workplace and thus been omitted from current employee lists. Also consider contractual personnel who may not be on workplace rosters but could also be exposed (e.g., housekeeping, cafeteria, business associates for meetings/conference, etc.). Investigators need to be aware of the sensitivities surrounding the immigration status of workers and how this can be a barrier to case investigation and contact tracing activities. Assurances should be made that all information collected will be used exclusively for public health purposes and not shared with immigration authorities.

Workplace administrators or managers are likely to express concern regarding liability, lost productivity, sick leave policies, responsibility for testing and screening, and media coverage. In addition, they might have limited obligations to protect patient confidentiality. All of these issues can be addressed during planning. For example, the assistance of the health department's media relations specialist can be offered to the workplace. For questions of liability and requirements under law, discussions between the health department's and the workplace's legal counsels are recommended. Unions may also be engaged and have concerns about worker safety and other issues.

Multiple outbreaks of COVID-19 among meat and poultry processing facility workers have occurred in the United States recently. CDC provides [guidance](#) for meat and poultry processing workers and employers—including those involved in beef, pork, and poultry operations.

Hospitals and Other Healthcare Settings

Nearly every type of healthcare setting has been impacted by transmission of SARS-CoV-2, and [guidance](#) on preventing transmission has been provided by CDC. State governments have different degrees of regulatory authority over healthcare settings. Personnel collaborating with hospitals and other healthcare entities should have knowledge of applicable legal requirements.

Nursing homes and other long-term care facilities (LTCF) have been especially vulnerable to COVID-19 outbreaks. Recent experience with [outbreaks in nursing homes](#) has also reinforced that residents with COVID-19 may not be willing or able to report typical symptoms such as fever or respiratory symptoms; some may not report any symptoms. CDC has [guidance](#) on how LTCF and nursing homes can be prepared to prevent COVID-19. The Centers for Medicare and Medicaid Services (CMS) also provides [guidance](#) for nursing homes.

Infection control practitioners may or may not be familiar with COVID-19 case investigations and contact tracing. An investigation should be planned jointly as a collaboration between the facility and the health department, including the facility's occupational health services and infection protection and control staff. Initial discussions should cover data sharing and division of responsibilities.

Liability, regulations, confidentiality, media coverage, and occupational safety are complex for healthcare settings. Occupational Safety and Health Administration ([OSHA](#)) rules, which are interpreted differently by different jurisdictions, might require hospital administrators to report when employees have been diagnosed with COVID-19 from occupational exposure. Public health officials should consider inviting legal counsel to the initial planning sessions with healthcare administrators.

Schools and Child Care Settings

This category includes childcare centers, preschools, primary through secondary schools, vocational schools that replace or immediately follow secondary school, and colleges and universities. CDC issued [guidance](#) for administrators of public and private child care programs and K-12 schools, as well as [guidance](#) for administrators of public and private institutions of higher education (IHE) and [guidance](#) for child care programs that remain open.

During an outbreak in these settings, a coordinated investigation that includes communication and collaborative decision making with education agencies and parents can increase the efficiency and success of the process. Consent, assent, and disclosure of information are more complex for non-emancipated minors than for adults. Each interaction with a minor is also a potential interaction with the family. The health department typically has limited alternatives for evaluating a minor if permission is not granted. Anticipatory legal consultation is recommended.

The presence of COVID-19 in schools often generates publicity. Ideally, the health department should communicate with the school and parents/guardians before any media coverage occurs. Public health officials should anticipate media coverage and plan a collaborative strategy.

Public health officials should consider extramural activities and other exposure sites and contacts. Clubs, sports, and certain classes require the case investigator to obtain additional information when interviewing the patient, the patient's parents/guardians, and school personnel. For patients with COVID-19 who ride school buses, a bus company might keep a roster of riders with addresses.

The strategy for case investigation and contact tracing in child care centers, preschools, and primary schools depends on whether the person diagnosed with COVID-19 is a child or an adult (e.g., a teacher or caregiver). In a case investigation of a child aged <5 years who has COVID-19 and who attends preschool or child care, all adults in these settings should be included if the source of the child's infection has not been located in the family or household. Certain home-based child care centers include adults who do not provide child care but still share space or interact with the children.

School breaks, vacations, graduations, and transfers can disrupt the case investigation and contact tracing. In collaboration with school officials, the health department can notify students and other contacts who will be unavailable at the school. These contacts should be referred for testing.

Shelters and Other Settings Providing Services for People Experiencing Homelessness

CDC has [guidance](#) on how to investigate potential cases of COVID-19 among people living in a homeless shelter or living in an unsheltered situation. In addition, CDC has provided [guidance](#) for homeless service providers to plan and respond to COVID-19. Please access these guidance documents for detailed information.

VII. Special Considerations

This section provides general guidance and highlights key issues that may need thoughtful attention.

Special Sites Not Under Jurisdiction

Examples of sites that are not under the jurisdiction of the state, territorial, or local health department are those under the jurisdiction of the US government (e.g., military bases and federal correctional facilities), diplomatic missions, or reservations for American Indian/Alaska Native tribes. If these sites have their own healthcare systems, the health department can offer technical consultation and can share and request data from case investigations and contact tracing. At sites that do not have healthcare systems, agreements can be made between local infection control officials and the onsite authorities to delegate the public health response to the health department.

Patients Unable to Participate

There may be instances when COVID-19 patients have difficulty recalling close contacts (e.g., substance use or cognitive impairment) or they are unavailable for inquiry (e.g., died before an interview could be conducted, are intubated, unconscious, a minor, mentally incapacitated, or intellectually disabled). Social-network information, setting-based investigations, and proxy interview methods are recommended to supplement the contact list. In lieu of the ability to speak to the patient, details to inform case investigation and contact tracing may be gleaned from healthcare providers or legal proxies.

Culturally and Linguistically Diverse Minority Populations

Culturally and linguistically diverse minority populations are growing in the United States. These populations include [racial and ethnic minorities](#), members of tribal nations, immigrants (i.e., those born outside the United States) and refugees. They may be at higher risk for COVID-19 or worse health outcomes due to a number of reasons including living conditions, work circumstances, underlying health conditions, and limited access to care.

It is important that case investigations and contact tracing are conducted in a culturally appropriate manner, which includes meaningfully engaging community representatives from affected communities, collaborating with community-serving organizations, respecting the cultural practices in the community, and taking into consideration the social, economic and immigration contexts in which these communities live and work.

To help build trust, jurisdictions should try to employ public health staff who are of the same racial and ethnic background as the affected community and are fluent in their preferred language. When that is not possible, it is important to provide interpreters for individuals who have limited English proficiency and consider translating the data collection instruments. Core demographic variables should be included in case investigation and contact tracing forms, including detailed race and ethnicity, as well as preferred language. Finally, given that minority populations experience discrimination and may be stigmatized or otherwise harmed for their participation, it is important to ensure the privacy and confidentiality of data collected and to ensure that the participant is aware of these safeguards.

Interjurisdictional Case Investigation and Contact Tracing

Patients diagnosed with COVID-19 may live in one jurisdiction and work in another, so collaboration between jurisdictions to synchronize community messaging can be helpful. Timely and confidential transfer of patient and close contact information to facilitate testing (if available), self-isolation/self-quarantine, and clearance to return to work are essential to keeping communities healthy.

Ideally, each jurisdiction will assign a person or team to send and receive reports from other jurisdictions of any patients diagnosed with COVID-19 and close contacts who reside in their jurisdiction. The jurisdiction where the patient resides is responsible for leading the investigation and notifying other health departments of any close contacts and/or congregate settings needing investigation in their area. Bi-directional confidential

communication between health departments should include COVID-19 test results related to the investigation and confirmation of patients and contacts being released from self-isolation/self-quarantine.

There are nuances to each situation, and joint planning and problem-solving is recommended. A team of representatives from multiple health departments can increase the efficiency of larger investigations by planning the overall strategy together and monitoring the progress. Health department TB, HIV, and STD programs have established protocols to transfer confidential data between jurisdictions and can be a resource. Developing systems to share information about new or ongoing case investigations and contact tracing across jurisdictional boundaries is critical to ensure that appropriate COVID-19 patients and close contacts are being interviewed and monitored.

Patients with COVID-19 Traveling Within the United States or Internationally

Our nation's population is mobile, with people traveling between states and internationally for work and leisure on a daily basis. Interjurisdictional communication is essential to the success of case investigations and contact tracing spanning multiple jurisdictions. Officials from the health department that initially encounter the patient with a positive SARS-CoV-2 laboratory result or probable diagnosis should interview the patient to gather as much identifying and locating information as possible for the patient, any close contacts visited, and events attended during the patient's travels, as well as information about the mode of travel. These data should be shared with the jurisdictions in which the close contacts are located. If the patient is initially interviewed in a jurisdiction other than his or her residence, information should be transferred between jurisdictions for continuity of case management. If a person becomes symptomatic after they have returned home from their trip, it will be important to assess whether the flight (or other mode of transportation) was within the contact elicitation window. If so, flight information should be obtained and appropriate authorities informed, and close contacts participating in the journey notified. The jurisdiction where the patient resides is assigned responsibility for managing the overall investigation.

Case investigations and contact tracing for flights arriving in the United States or between US states, or cruise ships arriving at a US port, are coordinated by CDC. To initiate case investigation and contact tracing of an aircraft or ship, the health department managing the overall investigation should notify the [CDC quarantine station](#) with jurisdiction for their area. CDC will obtain identifying and locating information for potentially exposed passengers and provide that information to health departments with jurisdiction for where the contacts reside. These health departments then follow-up with contacts within their jurisdiction and report outcomes to the relevant CDC quarantine station. For international flights departing the United States, CDC will notify public health authorities at destinations who will be responsible for conducting the aircraft case investigation and contact tracing.

VIII. Building Community Support

The success of a case investigation and contact tracing program hinges on a community's level of participation. For many community members, this may be the first time they've engaged with public health personnel. Jurisdictions will need to communicate clearly with the public to generate an understanding and acceptance of case investigation and contact tracing as an important way to protect friends, family, and community members from future potential infections.

A jurisdiction's case investigation and contact tracing plan should include a communication strategy that engages community leaders and key public officials. Local community leaders, public officials, and influencers can amplify clear, empowering messages that support case investigation and contact tracing activities and encourage community members to take responsibility for their health and the health of their community by following guidance from public health agencies. Jurisdictions should consider using all available communication channels to regularly reinforce these messages including television, radio, and social media, along with official websites.

In addition to case investigation and contact tracing awareness messages, jurisdictions should develop and share messages that dispel misinformation in their community and direct the public to reliable sources. There may be concerns about COVID-19 scams, so it will be particularly important that community members know where to go for verified information. Consideration should be made to cultural sensitivity and language diversity when developing messages and outreach materials. Messages should also be tailored to reach specific audiences, including vulnerable populations within the community.

IX. Data Management

The development and implementation of a robust data management infrastructure will be critical for assigning and managing investigations, linking patients with confirmed and probable COVID-19 to their contacts, and evaluating success and opportunities for improvement in a case investigation and contact tracing program. COVID-19 case investigations will likely be triggered by one of three events:

1. A positive SARS-CoV-2 laboratory test or
2. A provider report of a confirmed or probable COVID-19 diagnosis or
3. Identification of a contact as having COVID-19 through contact tracing

Data management systems should be able to capture these three types of events electronically. Ideally laboratory, provider, and contact case reports should be transmitted to the local health authority electronically and then seamlessly imported into the system in an automated fashion.

Upon receipt of a triggering event, the case investigation and contact tracing system should assign an auto-generated, unique patient identifier to the patient report. The unique IDs should not include a component of personal identifying information (e.g., date of birth, patient initials). The system should allow for the assignment of new investigations to contact tracing staff with clear modules for the investigation. Module components that should be considered include:

- Patient locating and sociodemographic information (e.g., date of birth, race/ethnicity, residential address) and COVID-19-specific information (e.g., symptoms, date of symptom onset, date of SARS-CoV-2 testing, test results, hospitalizations, co-morbid conditions).
- Patient risk assessment (e.g., specific people the patient had close contact with during the contact elicitation window, community locations where the patient visited and may have exposed others (e.g., supermarket, workplace, public transportation). Greater specificity in the information collected can greatly improve the effectiveness of contact tracing, so the system should be flexible enough to allow for text field entry but structured enough that frequency distributions of locations and people can be quickly obtained.
- Named contacts should be captured on a separate module which includes all information provided by the patient, as well as additional risk assessment information for the contact (e.g., location and close contacts they may have had during their contact elicitation window). This module should allow for the entry of specific people (Jane Doe), people with partial contact information (Doug from the neighborhood BBQ) and locations (bus or train routes, neighborhood grocery store). This module should also create a unique identifier that can be assigned to each contact using the same conventions as above, and that will allow for a contact to be linked to the case and to also turn into a patient if they are in fact infected with SARS-CoV-2. Additional information to collect from the contacts include any symptoms of COVID-19, symptom onset dates, and dates and results of SARS-CoV-2 tests, as well as whether they were previously aware or informed of their exposure.

In addition, every case and contact form should have a public health ID variable for program evaluation purposes.

Management of COVID-19 investigations will quickly become complicated as the number of case reports increases. The data system must be relational in nature and be able to link multiple individuals to many other individuals in the system. Assigning each individual in the system a unique ID will help support this. However, separate tables will be needed to account for the complex interconnectedness of many of the investigations.

Ideally, the data system should facilitate many-to-many relationship mapping between identified cases and contacts in order to support data analysis and source-spread mapping of COVID-19 transmission. The data system should be user-friendly, flexible and accessible by mobile device, as well as a laptop or desktop computer. A cloud-based system will allow the greatest flexibility and ensure routine data storage, protection and updating, but unique jurisdictional laws and regulations may necessitate on-premises data storage.

Additionally, the system should be able to be manipulated by public health informatics, data management and epidemiologic staff, without the need for support from the vendor or contractors. This will allow for rapid updates of modules as new data collection needs are identified, the ability to produce both canned and ad-hoc reports for management of investigations, and the ability to seamlessly integrate with other modules to perform quality assurance and more complicated network and epidemiologic analyses. The data system should also be interoperable with existing surveillance systems.

Ensuring local health authority IT and informatics support is critical. Involving relevant IT, informatics, fiscal, and leadership entities early can help overcome delays and cost over-runs in implementation and maintenance of the system. Additionally, consideration should be made to who has ultimate responsibility for the maintenance and upkeep of the system early to ensure the correct partners are engaged in system developments. [Data security and confidentiality standards](#) should be considered and incorporated into all plans related to case investigation and contact tracing activities.

X. Evaluating Success

Routine review of both process and outcome metrics will also be crucial for case investigation and contact tracing success. By examining these data regularly, issues can be identified and rapidly addressed, changes to internal case investigation and contact tracing processes can be made, and the local health authority can more easily pivot when new high-risk populations are identified. The uses of data related to case investigation and contact tracing fit broadly into four main domains:

1. Individual case investigation and contact tracing supervision and management
2. Programmatic process measures
3. Programmatic outcome measures
4. Ad-hoc epidemiologic and other public health analyses

Here we will focus on the first three mentioned above.

During case investigations and contact tracing, it takes time to identify and interview patients and then counsel and test all contacts. Examining “live” data for evaluation can lead to spurious or false inferences as there has not been enough time to finish and close out open or pending investigations.

Consider adding a lag period to all reports or data runs to ensure that partial or ongoing investigations are not being included in reports and metrics.

Also consider setting targets for select process and outcome metrics (especially for timeliness of patient and contact notification and self-isolation/self-quarantine) to guide adjustments to policies and protocols.

Individual case investigation and contact tracing supervision and management

To support supervision of case investigation and contact tracing staff, canned reports at the level of the individual case investigator and contact tracer will help ensure that staff are meeting expectations and identify areas for additional training. Reports can be produced for a 2-week review period and could include:

- Number of case investigations assigned during review period
- Number of patients interviewed during review period
- Number and percentage of patients interviewed >24 hours from report to health authority during review period
- Number of case investigations closed during review period
- Number and percent of case investigations in which at least one close contact was elicited during review period
- Median number of days from assignment of investigations to interview during review period
- Total number of contacts elicited from case investigations during review period
- Median number of contacts elicited from patients per case interview during review period, among cases where at least one contact was elicited
- Number of contacts notified during review period and percent out of total number of contacts named
- Total number of contacts interviewed/total number of contacts named by cases during review period
- Median number of days from initiation/assignment of contact to notification during review period
- Number of cases who completed isolation/total number of cases advised to isolate during review period
- Number of contacts who completed quarantine/total number of contacts advised to quarantine during review period
- Number of referrals to social support
- Number of referrals for clinical consultation

Programmatic process measures

Data examined among all case investigation and contact tracing staff will help provide leadership with insights into program successes and possible opportunities for additional training, resources or focus areas. These can be canned reports that are produced regularly (bi-weekly or monthly). These measures could include:

- Number of case investigations assigned during review period
- Number of patients interviewed during review period
- Number and percentage of patients interviewed >24 hours from report to health authority during review period
- Number of case investigations closed during review period
- Number and percentage of patients who named at least one close contact during review period
- Median days from receipt of report to interview during review period
- Total number of contacts elicited among case investigations during review period
- Total number of contacts interviewed/total number of contacts named by cases during review period
- Median number of contacts named per patient interview during review period
- Number of patients who completed isolation/total number of patients advised to isolate during review period
- Number of contacts who completed quarantine/total number of contacts advised to quarantine during review period
- Number of referrals to social support
- Number of referrals for clinical consultation

Programmatic outcome measures

- Number of patients interviewed / Number of case investigations
- Number of contacts tested for SARS-CoV-2 / Number of contacts interviewed
- Number and percentage of new confirmed COVID-19 cases arising from quarantined contacts
- Number of contacts self-quarantined as a result of contact tracing
- Number and percentage of patients who completed full self-isolation period
- Number of contacts who completed 14-day self-quarantine / notified contacts

XI. Confidentiality and Consent

All aspects of case investigation and contact tracing must be voluntary, confidential, and culturally appropriate.

Minimum professional standards for any agency handling confidential information should include providing employees with appropriate information and/or training regarding confidential guidelines and legal regulations. All public health staff involved in case investigation and contact tracing activities with access to such information should sign a confidentiality statement acknowledging the legal requirements not to disclose COVID-19 information. Efforts to locate and communicate with patients and close contacts must be carried out in a manner that preserves the confidentiality and privacy of all involved. This includes never revealing the name of the patient to a close contact unless permission has been given (preferably in writing), and not giving confidential information to third parties (e.g., roommates, neighbors, family members).

Maintaining confidentiality during COVID-19 case investigations and contact tracing can be particularly difficult in congregate settings. Prior discussions with the patient can generate solutions for safeguarding confidentiality. Onsite administrators/employers who already know confidential information regarding a patient or contacts can be asked to respect confidentiality, even if they are not legally bound to do so.

Legal and ethical concerns for privacy and confidentiality extend beyond COVID-19. All personal information regarding any COVID-19 patients and contacts should be afforded the same protections. This includes any and all patient records. Data and security protocols should include recommendations for password-protected computer access, as well as locked, confidential storage cabinets and proper shredding and disposal of notes and other paper records. Protocols should include instructions for the protection of confidential data and confidential conversations in a working-from-home setting (e.g., make telephone or video-conferencing calls from private room to avoid the conversation being overheard). Approaches to ensuring confidentiality and data security should also be included in training of staff.

XII. Support Services to Consider

Significant social support may be necessary to allow patients to safely self-isolate and contacts to safely self-quarantine. For some of the most vulnerable populations in the United States, self-isolation or self-quarantine will be a hardship that may be impossible without additional assistance. Adherence to isolation and quarantine instructions will greatly depend on each individual's safety, comfort, and health during this period. Social support services must be an integral component of a jurisdiction's case investigation and contact tracing activities. In developing jurisdictional protocols, programs must define their social support services package and eligibility criteria.

Many patients with COVID-19 and close contacts will be able to self-isolate and self-quarantine at home with a basic kit of resources, such as cloth face coverings, gloves, thermometers, hand sanitizer, disinfectants, and health education materials. Others may need additional wrap-around services, such as food and pharmacy delivery, laundry services, and garbage removal. Also, financial considerations must be made for those whose employment will be affected by their need to self-isolate or self-quarantine. There may be additional needs that persons with disabilities may require to successfully self-isolate or self-quarantine.

Care resource coordinators will be essential in this process, acting as a bridge between the patient and key service providers. The case resource coordinator will assist the patient in identifying services available to meet their needs. It will be essential that these staff be able to communicate in a culturally and linguistically appropriate manner. In some instances, care resource managers may be reflective of the affected communities and viewed as a trusted resource. Jurisdictions are encouraged to engage community leadership and community-based organizations that have strong ties to specific groups in the community with unique needs such as members of tribal nations, refugees, migrants and recent immigrants. This is particularly important during case investigation and contact tracing associated with clusters or outbreaks. If jurisdictions are unable to employ a care coordinator, they should ensure that case investigation and contact tracing staff are appropriately trained to evaluate patient and contact needs, assess their eligibility, and link them to the appropriate resources.

Social support services include:

- Basic social support such as food, household supplies, laundry, pharmacy, and garbage removal services. Internet access should also be considered.
- Provision of a telemedicine safety net pool of providers for on-call clinical consultations with patients and contacts who do not have a primary healthcare provider. Transportation to medical care should also be considered.
- Health insurance navigation, Medicare/Medicaid assistance, mental health treatment services, substance abuse and misuse services.
- Childcare and/or dependent adult care services support should also be considered for those who are the primary caregivers for family and other household members.
- Economic support to recover income lost during the self-isolation/self-quarantine period, including working with employers to provide paid time off, unemployment assistance, and negotiations with landlords.

Success in this area will require assessment of individual needs and cultural factors within communities, in addition to multi-sector partnerships to bring resources together for comprehensive support for individuals, their families and their communities. Jurisdictions should take inventory of the existing resources available to assist patients and contacts who are self-isolating/self-quarantining, as well as their families, and find ways to fill any critical service gaps.

Once social support services are in place, jurisdictions will need to determine how to rapidly triage requests and assess eligibility. It will be essential to have mechanisms in place to ensure that people under self-isolation/self-quarantine orders receive expedited waivers for eligibility criteria or an alternative source of support for basic psychosocial needs. Absence of timely support may cause hardship and a break in self-isolation/self-quarantine.

Out-of-Home Isolation and Quarantine

Throughout the nation, there are many close-knit families with multiple generations living in the same household. Patients and contacts in these living situations may need to be supported with alternative living arrangements in order to protect their families and other household members. Others who may need alternate housing support include people being released from correctional institutions and those experiencing homelessness.

To address these situations, jurisdictions should identify facilities that can be used for alternative housing, as well as criteria to determine eligibility and access to out-of-home isolation and quarantine accommodations. Public health departments will need to engage other local government agencies and community organizations to partner for locally relevant housing solutions. Alternative housing may be necessary for people self-isolating/self-quarantining who are healthcare workers, living in group housing, living with individuals at high risk for severe disease, discharged from hospitals or correctional facilities, and experiencing homelessness and others in need. Behavioral health teams should be involved in the planning for these sites to facilitate continued access to support for people with substance use or mental health disorders.

Some states have established emergency orders to use hotels in order to support the isolation and quarantine of COVID-19 patients. Other states have engaged in cooperative agreements with facilities on an as-needed basis. Jurisdictions are using local hotels, dormitories, and disaster relief housing units for individuals who need to be relocated from their homes. Some jurisdictions are establishing large shelters in public buildings to house and monitor people experiencing homelessness. Others are setting up outreach systems for check-ins to monitor patients and contacts at tent encampments. It is important that facilities that are used for out-of-home isolation and quarantine be able to provide basic services and resources to those temporarily housed there.

XIII. Digital Contact Tracing Tools

There will be emerging information on smartphone-based exposure notifications from proximity tracking tools that could significantly increase the number of contacts that health departments are alerted to. As these tools are implemented, they should be used to initiate contact notification.

Case Management Tools

Case management tools for case investigation and contact tracing capture data on cases and contacts and can help improve the efficiency of manual contact tracing and medical monitoring methodologies. A case management tool should generally have the following capabilities:

1. Ability to ensure data security and confidentiality of patient information, which is critical to consider in the development of any case management tool.
2. Interoperability capabilities to receive input from the public health authorities (PHA) (including local, state, tribal, and territorial public health departments), information systems and/or laboratory systems, either via import or real-time synchronization.
3. Ability to facilitate identification/elicitation and documentation of known contacts of patients with COVID-19, both through manual entry by the PHA and via self-report from cases.
4. Ability to send notifications to users (patients and contacts) via manual and/or automated means. These messages will include:
 - a. Notification to contacts of their exposure and time window when exposure may have occurred.
 - b. Initial survey about their symptoms and clear instructions on how to regularly monitor their symptoms and health status and report that information every day. (This will ensure their data reaches the contact management team at the PHA and that aggregate data reach relevant state and federal partners.)
 - c. Public safety messages to identified contacts to educate them about COVID-19, its common signs and symptoms, and reinforcing prevention messages defined by the government, such as self-quarantine and social distancing. (This messaging should be repeated daily throughout the contact's self-quarantine period with new information supportive of the evolving stage of isolation.)
5. Ability to send notifications in multiple formats, such as voice messages, emails, and SMS.
6. Capability for contact-generated and system-generated alerts or workflows (e.g., contact failed to follow-up, presence of symptoms, contact request for information).
7. Ability to produce individual-level and aggregate data supporting worker and PHA-level process metrics as described above.

Preliminary evaluations were conducted on ready-to-implement tools (e.g., proximity contact tracing, medical monitoring aids, data management systems) based on a standard set of criteria ([Preliminary Criteria for the Evaluation of Digital Contact Tracing Tools for COVID-19](#)). CDC continues to evaluate tools and assess their suitability for use to facilitate specific activities in the case investigation, contact tracing, and monitoring workflows.

Medical Monitoring Tools

A variety of medical monitoring tools are currently in use by health departments to communicate with patients and contacts for TB, and other infectious diseases. These tools can help improve the efficiency in medical monitoring in both active engagement (e.g., Skype, Facetime, Zoom) of high-risk individuals, and self-report of daily temperature check, signs and symptoms (e.g., recorded video) for others diagnosed or exposed to COVID-19. In addition, some case management systems have built in technology to push system-generated alerts (e.g., request to check-in the day prior to end of patient self-isolation or contact self-quarantine). Ensuring data

security and confidentiality of patient information is critical to consider in the development of any case management tool.

Proximity Tracking Tools

There are numerous initiatives that propose to use smartphones as “sensors” to detect proximity and exposure to individuals who may have COVID-19. Proximity-tracking tools propose to relieve several challenges associated with traditional case investigation and contact tracing and have been implemented in several countries. Several ongoing efforts in the United States and internationally seek to develop privacy-preserving, accurate, and energy-efficient applications for use on mobile devices. There are currently very limited data on the performance of these applications in US communities; particularly the sensitivity and specificity of these methods as it pertains to identifying true close contacts. Many tools are not yet widely available, and there remain critical gaps that could pose challenges to their implementation.

There are two major technologies that are under discussion in the United States – Bluetooth and GPS. At present, many consider Bluetooth to be more promising than GPS. There are currently little published empirical data showing the capabilities of either technology. Some preliminary advantages, disadvantages, and implementation challenges are listed below. It is assumed that people would voluntarily agree to participate and would have an opt-in option.

Potential Advantages of Bluetooth and GPS-enabled tools for case investigation and contact tracing:

1. Preserves the patient’s or contact’s ownership of their health information and preserves their agency to opt-in to sharing relevant information with public health authorities.
2. Augments capacity of case investigator and contact tracer workforce (e.g., may decrease burden of manual contact elicitation, help to identify contacts in a timelier manner, facilitate communication with contacts, and help ensure rapid isolation of contacts to interrupt the chain of transmission).
3. Augments contact identification by identifying potentially unknown contacts.
4. Provides more comprehensive mobility history, which serves as a mnemonic to elicit potential aggregate setting and community exposures (GPS).
5. Provides granularity of proximity and associated temporal data that may be useful in stratifying contacts into different exposure risk categories that PHAs can match with differing levels of tracing, notification and monitoring.

Potential Disadvantages:

1. Has inherent socioeconomic and technology literacy biases – requires that patients and contacts have access to a smartphone, knowledge of how to install apps, and literacy to navigate app menus.
2. May not be effective until a “critical mass” of users in a community are using the apps.
3. Requires individuals to keep their smartphones on them at all times with the appropriate functions enabled and depends on users to elect to share their information with PHAs.
4. Disparate data formats from multiple apps may not be interoperable and could add burden on PHAs for integrating data seamlessly into their case management and contact tracing systems and workflows.
5. May require more consultation on the ethical and legal issues related to electronic tracking.
6. Hacking and other unauthorized access or use of data may compromise data security and confidentiality.

Implementation challenges:

1. Social mobilization and mass marketing media campaigns are required to gain a critical mass behind one or more application for broad public usage.
2. Building and sustaining public trust in PHA’s ability and intention to preserve the privacy of individuals is crucial to widespread adoption of new technologies.

3. Systems are needed to integrate disparate data streams into PHA information systems without compromising the integrity of existing workflows and to safeguard against false-positive alerts.

For more information on digital contact tracing, visit the following resources:

- [Digital Contact Tracing Tools for COVID-19](#)
- [Preliminary Criteria for the Evaluation of Digital Contact Tracing Tools for COVID-19](#)

XIV. Resources

These additional resources may be of use as jurisdictions plan and operationalize their contact tracing efforts.

Resources from CDC and Other Federal Agencies

- [CDC Support for States, Tribes, Localities and Territories](#)
- [Principles of Contact Tracing to Stop COVID-19](#)
- [Sample Contact Tracing Training Plan](#)
- [Implementation of Mitigation Strategies for Communities with Local COVID-19 Transmission](#)
- [Guidelines for Opening Up America Again](#)
- Opening Up America Again Testing [Overview](#) and [Blueprint](#)

Resources from other agencies and organizations

These resources are cited for informational purposes only, and their inclusion in this document does not indicate an actual or implied endorsement by CDC.

- [A National Plan to Enable Comprehensive COVID-19 Case Finding and Contact Tracing](#)—Johns Hopkins Center for Health Security and ASTHO
- [ASTHO COVID-19 Resources](#)—Association of State and Territorial Health Officers
- [Box It In Strategy](#)—Resolve to Save Lives
- Considerations for [Loosening](#) and [Tightening](#) Mitigation Measures—Resolve to Save Lives
- [Contact Tracing Overview](#)—Resolve to Save Lives
- [Contact Tracing Staffing Calculator](#)—Resolve to Save Lives
- [COVID-19 Command Center](#)—National Coalition of STD Directors
- [NACCHO COVID Response Effort](#)—National Association of County and City Health Officers
- [National Coronavirus Response: A Road Map to Reopening](#)—American Enterprise Institute

Appendix A – Glossary of Key Terms

Term	Definition
<i>Case Investigation & Contact Tracing</i>	Fundamental activities that involve working with a patient who has been diagnosed with an infectious disease to identify and provide support to people (contacts) who may have been infected through exposure to the patient. This process prevents further transmission of disease by separating people who have (or may have) an infectious disease from people who do not.
<i>Close Contact</i>	<i>Someone who was within 6 feet of an infected person for at least 15 minutes starting from 48 hours before illness onset until the time the patient is isolated.</i> Data are limited to precisely define the “prolonged exposure” to determine “close contact”, however 15 minutes of close exposure can be used as an operational definition for contact investigation. Factors to consider when defining close contact include proximity, the duration of exposure (e.g., longer exposure time likely increases exposure risk), whether the individual has symptoms (e.g., coughing likely increases exposure risk) and whether either the case patient or contact were wearing an N95 respirator (which can efficiently block respiratory secretions from contaminating others and the environment). At this time, differential determination of close contact for those using fabric face coverings is not recommended at this time.

	<p>In healthcare settings, it is reasonable to define a prolonged exposure as any exposure greater than 10 minutes because the contact is someone who is ill. Brief interactions are less likely to result in transmission; however, symptoms and the type of interaction (e.g., did the person cough directly into the face of the individual) remain important.</p> <p>https://www.cdc.gov/coronavirus/2019-ncov/php/public-health-recommendations.html</p>
<i>Confirmed COVID-19 Case</i>	<p>Report of person with COVID-19 and meeting confirmatory laboratory evidence</p> <p>https://wwwn.cdc.gov/nndss/conditions/coronavirus-disease-2019-covid-19/case-definition/2020/</p>
<i>Contact Elicitation Window</i>	<p>The timeframe when the case was likely infectious and not under isolation. This is the time period for which possible contacts should be elicited.</p>
<i>Critical Infrastructure Worker</i>	<p>Workers in 16 different sectors including Chemical, Commercial Facilities, Communications, Critical Manufacturing, Dams, Defense Industrial Base, Emergency Services, Energy, Financial Services, Food and Agriculture, Government Facilities, Healthcare and Public Health, Information Technology, Nuclear Reactors, Materials, and Waste, Transportation Systems, and Water and Wastewater Systems. These workers include: (a) federal, state and local law enforcement; (b) 911 call center employees; (c) fusion center employees; (d) public and private hazardous material responders; (e) janitorial and custodial staff; (f) workers and contractors in the food and agriculture, critical manufacturing, informational technology, transportation, energy, and government facilities industries. https://www.cdc.gov/coronavirus/2019-ncov/downloads/critical-workers-implementing-safety-practices.pdf</p>
<i>Exposure</i>	<p>Having come into contact with a cause of, or possessing a characteristic that is a determinant of, a particular health problem</p> <p>https://www.cdc.gov/csels/dsepd/ss1978/glossary.html</p>
<i>First-responder</i>	<p>Law enforcement, fire services, emergency medical services, and emergency management officials. https://www.cdc.gov/coronavirus/2019-ncov/hcp/guidance-for-ems.html</p>
<i>Healthcare personnel</i>	<p>All paid and unpaid people serving in healthcare settings who have the potential for direct or indirect exposure to patients or infectious materials, including body substances; contaminated medical supplies, devices, and equipment; contaminated environmental surfaces; or contaminated air.</p> <p>https://www.cdc.gov/coronavirus/2019-ncov/hcp/guidance-risk-assessment-hcp.html</p>
<i>Incubation period</i>	<p>Period of time between exposure to an infection and onset of symptoms</p>
<i>Isolation</i>	<p>The separation of a person or group of people known or reasonably believed to be infected with a communicable disease and potentially infectious from those who are not infected to prevent spread of the communicable disease. Isolation for public health purposes may be voluntary or compelled by federal, state, or local public health order.</p> <p>https://www.cdc.gov/quarantine/quarantineisolation.html</p>

<i>Multigenerational Household</i>	Households that consist of more than two generations living under the same roof. Many researchers also include households with a grandparent and at least one other generation. https://www.census.gov/library/publications/2012/acs/acsbr11-03.html
<i>Probable COVID-19 Case</i>	Report of person meeting clinical AND epidemiologic evidence of COVID-19 but without confirmatory laboratory evidence https://cdn.ymaws.com/www.cste.org/resource/resmgr/2020ps/interim-20-id-01_covid-19.pdf
<i>Quarantine</i>	The separation of a person or group of people reasonably believed to have been exposed to a communicable disease but not yet symptomatic from others who have not been so exposed to prevent the possible spread of the communicable disease. Quarantine may be voluntary or compelled by federal, state, or local public health order. https://www.cdc.gov/quarantine/quarantineisolation.html

Appendix B - Tips for Locating COVID-19 Cases and Contacts

When the locating information provided for a patient or close contact is insufficient, case investigation and contact tracing may come to an abrupt halt. The following list includes additional resources that may be used to obtain missing locating information and keep the investigation moving forward.

- ✓ State DMV records
- ✓ Online people search engines (may incur additional costs)
- ✓ Health department records
- ✓ [Social media/mobile apps](#)
- ✓ Following up with the index case to ask for additional locating information on a contact
- ✓ Jail and other correctional facility records
- ✓ Property tax records
- ✓ Frequent shopper cards
- ✓ Women Infants and Children Program, Food Stamps and other social services records
- ✓ Online white pages
- ✓ Google maps
- ✓ Employment records

Appendix C - Data Elements for Case Investigation and Contact Tracing Forms

Case Investigation

<i>Data Element</i>	<i>Type</i>	<i>Codes</i>	<i>Notes</i>
Contact Information	-	-	-
Investigator	Open Text		Name of investigator
Investigator ID	Numeric		
Date Assigned for Investigation	Date		
Index patient ID	Numeric		Autogenerated

Lot Number (to link related cases and contacts)	Numeric		To track clusters
Patient Last Name	Open Text		
Patient First Name	Open Text		
Patient Preferred Name	Open Text		
DOB	Date		
Gender	Categorical	M/F/Other/Unk	
Primary Language	Open Text/Categorical		
Interpreter used	Categorical	Y/N/U/R	
Residential Street Address	Open Text		
City of Residence	Open Text		
County of Residence	Open Text		
State of Residence	Open Text		
Zip code	Numeric		
Tribal Affiliation	Open Text		
Born in the United States	Categorical	Y/N/U/R	
Phone Number 1	Numeric		
Phone Number 2	Numeric		
Email 1	Open Text		
Email 2	Open Text		
Ok to Text	Categorical	Yes, No, Partial, Refused	
Ok to Email	Categorical	Yes, No, Partial, Refused	
Race	Categorical	Check all apply	Use Census or HHS categories
Ethnicity	Categorical	Check box	Use Census or HHS categories
Date of interview Attempt 1	Date		
Interview 1 occurred	Categorical	Yes, No, Partial, Refused	
Date of interview Attempt 2	Date		
Interview 2 occurred	Categorical	Yes, No, Partial, Refused	
Date of interview Attempt 3	Date		
Interview 3 occurred	Categorical	Yes, No, Partial, Refused	
Symptoms and Clinical Course			
Fever	Categorical	Check Box (Y/N/U/R)	

Cough	Categorical	Check Box (Y/N/U/R)	
Shortness of Breath	Categorical	Check Box (Y/N/U/R)	
Diarrhea/GI	Categorical	Check Box (Y/N/U/R)	
Headache	Categorical	Check Box (Y/N/U/R)	
Muscle ache	Categorical	Check Box (Y/N/U/R)	
Chills	Categorical	Check Box (Y/N/U/R)	
Sore throat	Categorical	Check Box (Y/N/U/R)	
Vomiting	Categorical	Check Box (Y/N/U/R)	
Abdominal Pain	Categorical	Check Box (Y/N/U/R)	
Nasal congestion	Categorical	Check Box (Y/N/U/R)	
Loss of sense of smell	Categorical	Check Box (Y/N/U/R)	
Loss of sense of taste	Categorical	Check Box (Y/N/U/R)	
Malaise	Categorical	Check Box (Y/N/U/R)	
Fatigue	Categorical	Check Box (Y/N/U/R)	
Other symptom	Categorical		
Other symptom description	Open Text		
Date of symptom onset	Date		
SARS-CoV-2 testing	Categorical	Check Box (Y/N/U/R)	
Date of first SARS-CoV-2 test	Date		
Results of first SARS-CoV-2 test	Categorical	Pos/Neg/Equi/Unk	
Date of last SARS-CoV-2 test	Date		
Results of last SARS-CoV-2 test	Categorical	Pos/Neg/Equi/Unk	
Hospitalized	Categorical	Yes, No, Partial, Refused	
Pneumonia	Categorical	Yes, No, Partial, Refused	
ECMO			
ICU	Categorical	Yes, No, Partial, Refused	
Death	Categorical	Yes, No, Partial, Refused	
Stroke	Categorical	Yes, No, Partial, Refused	
MI	Categorical	Yes, No, Partial, Refused	
Pre-existing conditions			
Chronic lung disease	Categorical	Yes, No, Partial, Refused	
Diabetes	Categorical	Yes, No, Partial, Refused	
Severe Obesity (BMI>=40)	Categorical	Yes, No, Partial, Refused	

CVD	Categorical	Yes, No, Partial, Refused	
Chronic renal disease	Categorical	Yes, No, Partial, Refused	
Chronic liver disease	Categorical	Yes, No, Partial, Refused	
Immunocompromised	Categorical	Yes, No, Partial, Refused	
Pregnant (if Female)	Categorical	Yes, No, Partial, Refused	
Risk Factors			
Contact with confirmed COVID case	Categorical	Y/N/U/R	
Employed	Categorical	Yes/No-unemployed/No-retired/No-unable to work/No-student	
If employed, what occupation	Open text		
If employed, what kind of workplace	Open text		
HCP	Categorical	Y/N/U/R	Work or volunteer in a healthcare setting
If HCP, what kind of setting			
Hospital	Categorical	Check box	
Ambulatory care	Categorical	Check box	
EMS/Fire/Law Enforcement/1st responder	Categorical	Check box	
Urgent care	Categorical	Check box	
Long term care	Categorical	Check box	
Hospice	Categorical	Check box	
Name of HCP setting	Open Text		
Address of HCP setting	Open Text		
Congregate setting	Categorical	Y/N/U/R	Do you live or work in congregate setting
If Congregate, what kind			
Corrections	Categorical	Check box	
Dorm	Categorical	Check box	
Group home	Categorical	Check box	
Multi-family household	Categorical	Check box	
Multi-generational household	Categorical	Check box	
Name of congregate setting	Open Text		

Address of congregate setting	Open Text		
Contact Tracing (during contact elicitation window)			
Any household contact	Categorical	Y/N/U/R	
Total Number of household contacts	Numeric		
Can you self-isolate	Categorical	Y/N/U/R	Add in script what this means (use of bedroom and bathroom away from others)
Do you need assistance to self-isolate	Categorical	Y/N/U/R	
Any intimate partners	Categorical	Y/N/U/R	Partners you do not reside with
Total Number of Intimate Partners	Numeric		
Any other people in close-contact with, including coworkers	Categorical	Y/N/U/R	

Contact Elicitation Investigation

<u>Data Element</u>	<u>Type</u>	<u>Codes</u>	<u>Notes</u>
Contact Information	-	-	Collected on the index
Investigator	Open Text		Name of investigator
Investigator ID	Numeric		
Date Assigned for Investigation	Date		
Index patient ID	Numeric		Autogenerated
Lot Number	Numeric		To track clusters
Date of contact elicitation	Date		
Start date of Contact Elicitation Window	Date		
End date of Contact Elicitation Window	Date		
Information about contacts			Ask for each identified contact
Contact Last Name	Open Text		
Contact First Name	Open Text		
Contact AKA	Open Text		
Contact Phone 1	Open Text		
Contact Phone 2	Open Text		
Contact email 1	Open Text		
Contact email 2	Open Text		
Contact social media handle 1	Open Text		Twitter, Grindr, etc.
Contact social media handle 2	Open Text		
Contact Address	Open Text		
Contact setting	Check all that apply		
Home	Check box		
School	Check box		
Day Care	Check box		
Workplace	Check box		includes customers/clients/patients and coworkers
Place of Worship	Check box		
Shelter	Check box		
Hospital/Medical Care	Check box		
Travel or Transit	Check box		
Retail setting	Check box		includes, supermarkets, gas stations, farmers markets, etc.
Duration of Exposure (minutes)	Numeric		

Pre-existing conditions			If known
Chronic lung disease	Categorical	Y/N/U/R	
Diabetes	Categorical	Y/N/U/R	
Severe Obesity (BMI>=40)	Categorical	Y/N/U/R	
CVD	Categorical	Y/N/U/R	
Chronic renal disease	Categorical	Y/N/U/R	
Chronic liver disease	Categorical	Y/N/U/R	
Immunocompromised	Categorical	Y/N/U/R	
Pregnant (if Female)	Categorical	Y/N/U/R	
Risk Factors			If known
HCP	Categorical	Y/N/U/R	Work or volunteer in a healthcare setting
If HCP, what kind of setting			
Hospital	Categorical	Check box	
Ambulatory care	Categorical	Check box	
EMT/Fire/1st responder	Categorical	Check box	
Urgent care	Categorical	Check box	
Long term care	Categorical	Check box	
Hospice	Categorical	Check box	
Congregate setting	Categorical	Y/N/U/R	Do you live or work in congregate setting
If Congregate, what kind			
Corrections	Categorical	Check box	
Dorm	Categorical	Check box	
Group home	Categorical	Check box	
Multi-family household	Categorical	Check box	
Multi-generational household	Categorical	Check box	
Community Settings			
Travel risk	Categorical	Y/N/U/R	Train, plane, public transit
Specify travel	Open Text		List specific flights, routes, etc.
Workplace	Categorical	Y/N/U/R	
Specify workplace	Open Text		Specific work locations
Retail	Categorical	Y/N/U/R	
Specify retail	Open Text		
Large community social event	Categorical	Y/N/U/R	
Specify	Open Text		
Recreational activity	Categorical	Y/N/U/R	

Specify	Open Text		
Places of Worship	Categorical	Y/N/U/R	
Specify	Open Text		

Contact Investigation

<u>Data Element</u>	<u>Type</u>	<u>Codes</u>	<u>Notes</u>
Contact Information	-	-	-
Investigator	Open Text		Name of investigator
Investigator ID	Numeric		
Date Assigned for Investigation	Date		
Index patient ID	Numeric		Autogenerated
Lot Number	Numeric		To track clusters
Contact patient ID	Numeric		
Contact Last Name	Open Text		
Contact First Name	Open Text		
Contact Preferred Name	Open Text		
DOB	Date		
Gender	Categorical	M/F/Other/Unk	
Primary Language	Open Text/Categorical		
Interpreter used	Categorical	Y/N/U/R	
Residential Street Address	Open		
City of Residence	Open Text		
County of Residence	Open Text		
State of Residence	Open Text		
Zip code	Numeric		
Tribal Affiliation	Open Text		
Born in the United States	Categorical	Y/N/U/R	
Phone Number 1	Numeric		
Phone Number 2	Numeric		
Email 1	Open Text		
Email 2	Open Text		
Ok to Text	Categorical	Yes, No, Partial, Refused	
Ok to Email	Categorical	Yes, No, Partial, Refused	
Race	Categorical	Check all apply	Use Census or HHS categories
Ethnicity	Categorical	Check box	Use Census or HHS categories
Date of interview Attempt 1	Date		

Interview 1 occurred	Categorical	Yes, No, Partial, Refused	
Date of interview Attempt 2	Date		
Interview 2 occurred	Categorical	Yes, No, Partial, Refused	
Date of interview Attempt 3	Date		
Interview 3 occurred	Categorical	Yes, No, Partial, Refused	
Any household contact	Categorical	Y/N/U/R	
Total Number of household contacts	Numeric		
Can you self-isolate	Categorical	Y/N/U/R	Add in script what this means (use of bedroom and bathroom away from others)
Do you need assistance to self-isolate	Categorical	Y/N/U/R	
Symptoms and Clinical Course			
Fever	Categorical	Check Box (Y/N/U/R)	
Cough	Categorical	Check Box (Y/N/U/R)	
Shortness of Breath	Categorical	Check Box (Y/N/U/R)	
Diarrhea/GI	Categorical	Check Box (Y/N/U/R)	
Headache	Categorical	Check Box (Y/N/U/R)	
Muscle ache	Categorical	Check Box (Y/N/U/R)	
Chills	Categorical	Check Box (Y/N/U/R)	
Sore throat	Categorical	Check Box (Y/N/U/R)	
Vomiting	Categorical	Check Box (Y/N/U/R)	
Abdominal Pain	Categorical	Check Box (Y/N/U/R)	
Nasal congestion	Categorical	Check Box (Y/N/U/R)	
Loss of sense of smell	Categorical	Check Box (Y/N/U/R)	
Loss of sense of taste	Categorical	Check Box (Y/N/U/R)	
Other symptom	Categorical		

Other symptom description			
Date of symptom onset	Date		
SARS-CoV-2 testing	Categorical	Check Box (Y/N/U/R)	
Date of first SARS-CoV-2 test	Date		
Results of first SARS-CoV-2 test	Categorical	Pos/Neg/Equi/Unk	
Date of last SARS-CoV-2 test	Date		
Results of last SARS-CoV-2 test	Categorical	Pos/Neg/Equi/Unk	
Pre-existing conditions			
Chronic lung disease	Categorical	Yes, No, Partial, Refused	
Diabetes	Categorical	Yes, No, Partial, Refused	
Severe Obesity (BMI \geq 40)	Categorical	Yes, No, Partial, Refused	
CVD	Categorical	Yes, No, Partial, Refused	
Chronic renal disease	Categorical	Yes, No, Partial, Refused	
Chronic liver disease	Categorical	Yes, No, Partial, Refused	
Immunocompromised	Categorical	Yes, No, Partial, Refused	
Pregnant (if Female)	Categorical	Yes, No, Partial, Refused	
Risk Factors			
Contact with confirmed COVID case	Categorical	Y/N/U/R	
Employed	Categorical	Yes/No-unemployed/No-retired/No-unable to work/No-student	
If employed, what occupation	Open text		
If employed, what kind of workplace	Open text		
HCP	Categorical	Y/N/U/R	Work or volunteer in a healthcare setting
If HCP, what kind of setting			
Hospital	Categorical	Check box	

Ambulatory care	Categorical	Check box	
EMS/Fire/Law Enforcement/1st responder	Categorical	Check box	
Urgent care	Categorical	Check box	
Long term care	Categorical	Check box	
Hospice	Categorical	Check box	
Name of HCP setting	Open Text		
Address of HCP setting	Open Text		
Congregate setting	Categorical	Y/N/U/R	Do you live or work in congregate setting
If Congregate, what kind			
Corrections	Categorical	Check box	
Dorm	Categorical	Check box	
Group home	Categorical	Check box	
Multi-family household	Categorical	Check box	
Multi-generational household	Categorical	Check box	
Name of congregate setting	Open Text		
Address of congregate setting	Open Text		

Appendix D – Tool for Estimating the Number of Contact Tracers Needed

Once states have lower COVID-19 case rates for at least 14 days, widely available testing, and adequate medical/hospital resources, contact tracing becomes an important strategy to eliminate transmission of SARS-CoV-2, the virus that causes COVID-19. Contact tracing involves [multiple steps](#), including case investigation of COVID-19 patients, notification of close contacts, and daily monitoring of close contacts. This process can be labor-intensive, and communities have different circumstances that affect contact tracing activities. These factors include the number of persons diagnosed with COVID-19 each day, number of contacts per patient, and the amount of time and resources needed to reach and follow the patients and contacts. The number of contact tracers needed is large and will vary by community. Each community will need to examine local case load and other factors to estimate how many contact tracers will be needed.

Mathematical modeling tools can be used to help estimate the number of contact tracers needed. These models require data to quantify each part of the process. The data used may differ among communities and over the course of the pandemic, which may lead to large differences in estimates from different models – or from the same model if using different values. Each community will need to determine some key parameters to be in the model. Local tuberculosis / sexually transmitted disease contact tracers are likely familiar with community-specific “inputs” regarding the average number of contacts per case and how difficult contacts are to find.

CDC does not endorse the use of a specific model; however, these tools may be used to guide planning and calculate resources needed under different scenarios. Each community should carefully incorporate as much knowledge about its situation as possible to estimate the number of contact tracers needed.

Content describing non-CDC tools in this document is provided for informational purposes only and is **not intended to indicate endorsement**, actual or implied, of the tools. Additionally, information on this site is provided “as is,” for users to evaluate and make their own determination as to their effectiveness.

Example using an available tool: [Contact Tracing Staffing Tool – Resolve to Save Lives](#)

This model is built into an Excel workbook and requires input on the following values:

- # new COVID-19 patients / day
- # close contacts / COVID-19 patient
- Proportion of patients who are easy / hard / hardest to reach (and never reached). The amount of time needed to arrange and conduct the initial interview with the index patient can vary.
 - Average time needed for patient investigation for each patient category
- Proportion of contacts who are household/easy/hard/hardest to reach (and never reached). Some contacts might live with the patient; other contacts might lack contact information and require fieldwork to identify.
 - Average time spent on contact notification for each contact category
- Proportion of contacts who can be followed in a mostly automated way versus those who need more staff time. For instance, contacts self-reporting their symptoms via email or text messages require much less time than contacts requiring daily telephone calls.
 - Average amount of time spent on contacts for each day in each category
- Days spent following contacts (e.g., 14 days after exposure)
- Staffing considerations:
 - Hours of daily productive work per contact tracer
 - Number of workdays per week per contact tracer
 - Number of contact tracers per manager

Changing the parameters in the model will change the estimated total staffing needed, even when keeping the number of daily new COVID-19 patients constant. (Note that this model does not specify overall population size. The total amount of work is proportional to the number of COVID-19 patients and contacts identified in each community rather than the total number of people living in the community.)

Estimates of contact tracers needed based on different assumptions in the model

Model developed by Resolve to Save Lives	Assumed daily COVID-19 Incidence / 100,000 persons	Contact tracing staff needed / 100,000 persons	Notes or assumptions
Contact Tracing Staffing Calculator - Lower estimate (See Appendix A)	9*	33	5 contacts per patient; contact tracers work 8 hours/day; contacts easy-to-reach; many contacts use app/email to report daily.
Contact Tracing Staffing Calculator – Higher estimate (See Appendix A)	136**	3,739	20 contacts per patient; contact tracers work 7-hour days; contacts harder to reach, take longer to interview, most require calls each day.

*Between April 15-23, 2020, the daily incidence of COVID-19 in the United States ranged between approximately 8 and 9 per 100,000 (between 25,858 and 29,916 new COVID-19 patients per day; assume US population of 328M).

**Approximate peak daily incidence of COVID-19 in New York City (approx. 11,400 incident new patients on 4/15/2020, assume NYC population of 8.4M).

Additional Considerations for Estimating Contact Tracing Resources

There are numerous factors that could affect contact tracer staffing needs that should be accounted for when estimating contact tracer needs:

- These estimates do not necessarily include all managers or additional professions needed.
- Increased case finding and testing efforts, as well as relaxing mobility restrictions could lead to more daily COVID-19 patients and/or contacts, which would require tracing resources.
- Effective contact tracing could reduce the number of new COVID-19 patients and contacts over time.
- Time from diagnosis to isolation for the index patient with COVID-19 will affect the number of contacts exposed and needing follow-up.
- Use of [digital contact tracing tools](#) could improve workflow efficiency or allow automated messages/contact self-report of symptoms to save contact tracer effort.
- These models do not necessarily apply to special populations such as people in prisons or long-term care facilities.

This information will be updated as more tools become available.

Appendix A – Parameter values used for high and low estimates (these are for illustrative purposes only)

Low Estimate Values – daily incident cases based on approximate average national daily incidence

Section 1 – General										
New cases per day			Number							
Average number of contacts per case			9							
			5							
Section 2 – Index case Investigation (locating and interviewing index case, determining infectious period, eliciting contacts, providing instructions for isolation, referring to social/medical services)										
			Proportion of all index cases	Number	Hours on case investigation	Total hours				
Cases "easy" to reach (phone number etc available)			0.7	6.3	4	25.2				
Cases harder to reach (no info initially available)			0.1	0.9	6	5.4				
Cases hardest to reach - requiring field outreach			0.1	0.9	6	5.4				
Cases never reached/lost to follow up			0.1	0.9	4	3.6				
check: add to 1?		1.00				Sum	39.6			
Section 3 – Contact notification (notifying contacts about exposure, providing instructions re: quarantine, referral for testing, referral for social/medical services)										
Number of contacts	40.5									
			Proportion of all contacts	Number	Hours on contact notification	Total hours				
Household contacts			0.7	28.35	0.5	14.175				
Non-HH contacts "easy" to reach (phone num available)			0.1	4.05	0.5	2.025				
Non-HH contacts harder to reach (no info initially available)			0.05	2.025	1	2.025				
Contacts hardest to reach - requiring field outreach			0.05	2.025	4	8.1				
Contacts never reached/lost to follow up			0.1	4.05	4	16.2				
check: add to 1?		1.00				Sum	42.525			
Section 4 – Follow up of cases and contacts (daily check-in, responding to questions, referral to services)										
Number of cases and contacts in follow-up	44.55									
			Proportion of all follow-ups	Number	Daily hours on follow up	Total Daily Hours	Days of follow up (eg 14)	Total Hours		
Lower intensity: mostly automated follow up and minimal Q&A throughout			0.70	31	0.1	3	14	90		
Higher intensity: non-automated follow up or lots of Q&A throughout			0.30	13	0.25	3				
Section 5 – Staffing assumptions										
8	Productive hours per workday (eg 8, or fewer to account for average non-tracing activities, time off, etc)									
5	Workdays per week (eg 5)									
10	Number of staff per Supervisor/Manager									
Section 6 – Staffing results										
			Staff needed	Hours (from above)	Proportion of all hours					
Index case investigation			7	40	0.23					
Contact notification			7	43	0.25					
Case and contact follow up			16	90	0.52					
Sum staff			30							
Supervisors/Managers			3							
Total staff			33							
Section 7 – Costs										

High Estimate Values – daily incident cases based on peak daily incidence from NYC (approx. 11,400 cases among 8.4M persons)

Section 1 – General										
New cases per day				Number						
Average number of contacts per case				136						
				20						
Section 2 – Index case Investigation (locating and interviewing index case, determining infectious period, eliciting contacts, providing instructions for isolation, referring to social/medical services)										
				Proportion of all index cases	Number		Hours on case investigation	Total hours		
Cases "easy" to reach (phone number etc available)				0.5	68		4	272		
Cases harder to reach (no info initially available)				0.2	27.2		6	163.2		
Cases hardest to reach - requiring field outreach				0.2	27.2		8	217.6		
Cases never reached/lost to follow up				0.1	13.6		8	108.8		
				check: add to 1?	1.00			Sum	761.6	
Section 3 – Contact notification (notifying contacts about exposure, providing instructions re: quarantine, referral for testing, referral for social/medical services)										
Number of contacts	2448			Proportion of all contacts	Number		Hours on contact notification	Total hours		
Household contacts				0.4	979.2		1	979.2		
Non-HH contacts "easy" to reach (phone num available)				0.1	244.8		1	244.8		
Non-HH contacts harder to reach (no info initially available)				0.2	489.6		2	979.2		
Contacts hardest to reach - requiring field outreach				0.2	489.6		8	3916.8		
Contacts never reached/lost to follow up				0.1	244.8		4	979.2		
				check: add to 1?	1.00			Sum	7099.2	
Section 4 – Follow up of cases and contacts (daily check-in, responding to questions, referral to services)										
Number of cases and contacts in follow-up	2325.6			Proportion of all follow-ups	Number		Daily hours on follow up	Total Daily Hours	Days of follow up (eg 14)	Total Hours
Lower intensity: mostly automated follow up and minimal Q&A throughout				0.30	698		0.1	70	14	8498
Higher intensity: non-automated follow up or lots of Q&A throughout				0.70	1628		0.33	537		
Section 5 – Staffing assumptions										
7	Productive hours per workday (eg 8, or fewer to account for average non-tracing activities, time off, etc)									
5	Workdays per week (eg 5)									
7	Number of staff per Supervisor/Manager									
Section 6 – Staffing results										
		Staff needed		Hours (from above)		Proportion of all hours				
Index case investigation		152		762		0.05				
Contact notification		1420		7099		0.43				
Case and contact follow up		1700		8498		0.52				
		Sum staff		3272						
	Supervisors/Managers	467								
	Total staff	3739								